Children and Music: Developmental Perspectives

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Keynote Address

Musical Learning as Cultural Practice: As Exemplified in Computer-Based Music-Making

Göran Folkestad

Introduction

Throughout time people have created music, and a culture without music has yet to be found. In their desire and need to express themselves through music, people have, besides using their voices, consistently made use of the everyday tools available to them at the time. Given this context, my paper will highlight some of the main ways in which young people express themselves through music when using one of today's most important tools – the computer. It should be noted that my paper, in full published in Folkestad (1998), will be based on my doctoral thesis *Computer based creative music-making: Young people's music in the digital age*, accepted in 1996 by Göteborg University, Sweden. Some of the results have also been published in separate articles (i.e., Folkestad, Lindström, & Hargreaves, 1997; Folkestad, Hargreaves & Lindström, 1998). The purpose of the current presentation will be twofold: a) to briefly introduce the theoretical framework of the study, and b) to present a summary of the main account of the compositional styles employed by the young composers.

General Overview of Research in Music Education

Before presenting a description of the empirical study, it is important to outline some important aspects of the field of research in music education. This provides the overall context for my study and etablishes the paradigm from which I operate.

Most research in music education has dealt with music training in institutional settings such as schools, and is accordingly based on the assumption, either implicitly or explicitly, that musical learning results from a sequenced, methodical exposure to music teaching within a formal setting. This definition is not only problematic, but has serious consequences for how valid research questions are formulated, and for the applicability of research results in developing music teaching, and in developing music teacher training programmes. Consequently, in order to realise and understand the multidimensional character of music teaching, I believe that *musical learning* should be considered in a much broader and wider context than is typical of much contemporary research literature. This change in perspective can be summarised as a general shift in focus; *from teaching to learning*, and consequently from teacher to learner (pupil). Thus, it also implies a shift of focus, from 'how to teach' (teaching methods) and the outcome of teaching in terms of results as seen from the perspective of the teacher, to 'what to learn', the content of learning – in our case – how various musical phenomena are perceived, experienced and expressed in musical activities by the learner.

The great majority of *all* musical learning takes place outside schools, in situations where there is no teacher, and in which the intention of the activity is not to learn about music, but to play music, listen to music, dance to music, or be together with music. Each of these examples typify situations in which we experience music in one way or another. Today, this is further accentuated as a result of computers and new technology, which has not only revolutionised music production, but has also radically changed the conditions for all kinds of musical activities (Jones, 1992). Recent technological developments and the increasing impact of the media mean that listening to and creating music constitute a major and integrated part of many young people's lives. This means that a music teacher never meets musically ignorant, untutored, or uneducated pupils: On the contrary, when pupils come to school they all possess a rich and in some ways sophisticated musical knowledge, acquired from a variety of outside-school musical activities. One result of technology which makes it possible to come closer not only to music itself, but also to how it is created, is that attitudes towards the creation of music in Western societies have changed quite dramatically during recent decades, and are becoming more and more egalitarian. Creating music is no longer seen as reserved for musically trained

specialists, but as an activity in which everyone can participate. Using an artefact such as the computer can be seen as an embodiment of this changed conception of music. Furthermore, the theoretical framework for the study, in full presented in Folkestad (1996), is grounded in a research approach known as situated cognition (Greenfield, 1984; Resnick, 1987; Brown, Collins, & Duguid, 1989; Wineburg, 1989; Lave & Wenger, 1991; Butterworth, 1993; Chaiklin & Lave, 1993, Norman, 1993; Vera & Simon, 1993). On the basis of this, musical learning is seen and studied as a *cultural practice*.

The Present Study: Methodological Issues

The design of the present study aimed at creating a situation similar to the context of the out-of-school activity, in which young people create music of their own. By leaving out the teacher and the educational context as much as possible, the aim was to investigate the creation of music as it appears in informal learning situations outside school.

Computer equipment, besides providing a medium which facilitates music-making itself, also offers new and unique possibilities for the study of the process of music-making (Webster, 1988). Sloboda (1985) suggests as a method of studying composition processes "the 'live' observation of composers during a session of composition" (p. 103). He believes that "this requires a rare degree of co-operation from a composer" (p. 103), which has made this an uncommon method in practice. Another problem with observations is that the presence of the observer changes the situation under investigation (Ödman, 1992), and might therefore influence the results. That problem is exacerbated when studying novices who have not yet found their identity as creators, and are thus more easily affected by the presence of another person, especially if that person is regarded as an expert in the field.

In this respect, music technology was found to be helpful as a research tool. The option used was to continuously save the MIDI information from the creating process in the computer files, and thereby get the chance to follow, analyse and compare the course of events afterwards, from the first idea until the completed piece of music. An important advantage of this computerised portfolio-method (Wolf, 1988; Gardner & Perkins, 1989) is that the participants can work in privacy, without having another person watching them in close proximity.

Method

The present study was a three year project, in which a total of 14 participants, eight boys and six girls, aged 15-16 and with no previous experience of composition, worked individually after school once a week, with no teacher instructing them. The technique employed for recording the compositions was to use the *save as*-command (instead of the *save*-command, which obliterates the previous stage) to record each facet of the composition as it evolved into the finished product. In practice this was achieved by changing the name of the document each time a new event was about to be saved, simply by changing a letter behind the title of the song. In that way a number of files (MIDI-documents) covering the process of the creation of the tune were saved. In addition, interviews were regularly carried out each time a composition was completed. During these interviews participants were encouraged to described how they had worked to produce their composition and what thoughts underpinned their actions. The basic focus in these interviews was consequently on their activity, and their thoughts about it. The interviews were carried out at the work station. At the start of the interview the researcher and the participant listened to the composition together, and the participant was also presented with earlier versions of the same composition to comment upon during the interview.
The work stations consisted of one computer with a sequencer program (Williams & Howell, 1990), one multi-timbral synthesiser, and headphones. The demonstration of the equipment, lasting for about 15 minutes, included how to use the sequencer program as a multi-track recorder, how to choose sounds from the multi-timbral synthesiser, and address midi channels. All other instructions about the options in the program were made later during the work, on the initiative of the participants, and when asked for in their questions and problems. No manual of the program or any written instructions were given. The task was described quite simply to the participants as: *"Use this equipment for music-making in any way you like"*.

A total of 129 pieces of music were created, and during that work 887 MIDI-documents were saved. For each piece of music, the saved documents were listened through in order to sort out the process of creation. The recorded interviews and observations were transcribed verbatim and analysed in depth at a later stage.

Results: The typology of compositional styles

All the participants succeeded in composing music, and in the subsequent analysis, six qualitatively different ways of creating music were identified which could be divided into two main categories, HORIZONTAL and VERTICAL

The following is a summary of the main strategies participants employed during the process of producing their compositions. The choice of strategy or way of working, that is HORIZONTAL or VERTICAL, was used to denote the main difference between the modes of composition. These two categories were specifically devised in this context; they refer to compositional strategies, *not* to structures in the music itself.

Horizontal composition

As a first phase in horizontal composition, the song is completed in form and content from beginning to end. After this, the computer equipment is used for arrangement and instrumentation of the composition. The strategy, as it works conceptually, and also as it is visualised on the screen, implies that horizontal lines are being completed one by one, from beginning to end. A basic feature of the horizontal category of working is that *composition and arranging are treated by the composer as separate processes.*

Horizontal 1a: Composing at an instrument - arranging in front of the computer. This category is distinguished by the composition being produced as a unit by playing, listening and evaluating. This integrated process is not interrupted until the composition is completed as a whole. Subsequently, the composition is recorded on one track on the computer. Thus, the process represents a totality that is not interrupted until the entire composition, including melody, chords, and form, has come to an end.

This way of creating music presupposes that the composer's instrumental skill in playing the keyboard is good enough to be able to realise the musical ideas. Creating the music in this way also means that the piece is learned by heart, and rehearsed so well that the result of the recording seldom has to be corrected.

Horizontal 1b: Composing at an acoustic instrument using the computer as co-musicians. This category is characterised by the use of an acoustic instrument as a complement to the computer equipment, both in the actual composing, and in arranging/orchestrating. In the first phase of work, the composition is completed on the acoustic instrument. However, the finished composition is not transferred to the computer via the keys of the synthesiser, as was the case in HORIZONTAL 1A. The original composition is thus always to be found 'outside' the computer, and the different harmonies in the arrangement are tried out one by one on the instrument, and then transferred to the computer via the keyboard. The equipment thus functions as co-musicians in a band when a preliminary musical idea is tried out at the rehearsal, testing and developing it with the help of the various instruments in the band. The arranging is done by testing and recording track by track, and in this way the tune is built up continuously by playing 'live' on the acoustic instrument along with the computer instruments, and track by track recording how 'the others' are to play.

Horizontal 2: Horizontal composing element by element in front of the computer. As in the other categories of horizontal composition, work starts with the whole composition being conceived to completion; in this case the computer equipment is utilised from the very beginning. The composition is completed by trying different things out, element by element, until the melody and/or harmonies of the composition are correct from beginning to end. This strategy, both conceptually and also as visualised on the screen, implies that the first horizontal line representing the actual composition develops gradually. Its elements do not have to be musically organic sections, like verse or refrain, but are merely parts of varying length recorded

and interrupted at any point, and pieced together as a whole during the creation of the composition. As in HORIZONTAL 1, the subsequent instruments in its arrangement are then completed one by one, from beginning to end. Accordingly, the main difference between HORIZONTAL 1 and HORIZONTAL 2 is in the way the form and content of the composition are developed. In HORIZONTAL 2 this is achieved by playing/recording some bars with a varying degree of improvisation and deliberate testing, and then allowing the computer equipment to replay the recorded part. Using this strategy the composer listens, evaluates and retains what is good before continuing in the same manner with the next part.

Vertical composition

In vertical composition, each section of the piece is completed for all instruments before moving on to the next. When the first section is completed, there is as yet no idea of what is to follow, nor of the number of sections in the final composition. This is defined while composing. Thus, both composition and strategy take the form of vertical 'chunks', in which each chunk, comprising an organic musical part, is completed for all instruments before moving on to the next phase. The vertical way of thinking is shown by the way the instrumental structure is defined at an early stage for each phase (VERTICAL 1), or from the very start regarding the entire composition (VERTICAL 2). As a conclusion to this, *composition and arrangement/instrumentation are conceived as one integrated process* within the vertical strategies. In this work, vertical thinking finds its expression not only in working (moving) from top to bottom, but also by frequently back-tracking to re-record previously recorded instruments, this time with the more recent tracks as a reference. In this way, thinking – and the work itself – moves up and down between the various instruments, forming a vertical unit in the section being composed. This work is totally based on improvisation, and the possibilities provided by the equipment form the basis for this method of musical creation. Thus, the computer is used as an interactive medium to a greater extent than that described in HORIZONTAL 2, in that the sounding response from the equipment to an idea being tried out predominantly guides the development of the subsequent composition. The distinction could be described as follows: In HORIZONTAL 2, the task of the equipment was to represent the recording precisely in the way it was recorded – like a tape recorder; while in vertical composition the possibilities of the equipment are also utilised in processing the recorded material before it is replayed over again. In this way, the equipment is not merely used as an aid in the composition work, but is integral to this way of working.

Vertical 1a: Vertical composition section by section. This category is characterised by the formation of various sections, which are clearly discernible musically. When some of these sections are completed as described, the copy-paste function was often utilised in order to give the composition its final form. The instrumentation emerges part by part during the composing of the various sections. These are often made up of different 'orchestras', each playing its own part, and contrasting with each other, sometimes in a quasi *concerto grosso*-like manner. All these sections are held together by a drum accompaniment, which in most cases is the same throughout the piece, and consequently turns out to be what holds the piece together stylistically.

Vertical 1b: Vertical composition as sound composition (soundscape). In this category, the sounds and the created sound structures have a central function, and the musical pieces being created can chiefly be described as sound compositions or soundscapes in which the concrete sounds offered by the synthesiser are utilised. Because the tonal picture is essential in the creative process from the outset, and actually provides the basis for the work to proceed, the composing and arranging referred to above make up one integrated process. An exclusive feature of this category is that the time concept, manifested in periodicity, a clear metre, and other 'musical logic' as well as form based roles, is almost dissolved, or at least much more ambiguous. All the other categories have a kind of linearity, because the piece is written from A to B, or from A to A via B, none of which are features of VERTICAL 1B, in which the sounds and sections can be placed and mixed in any way.

Vertical 2: Vertical composition, starting by defining the orchestra. In this category, the composing originates from a tonally and stylistically comprehensive picture of what the finished composition will sound like. Consequently, the work is initiated by defining the orchestra. Expressed in terms of traditional composing, the composer begins by setting up the score, defining which instruments are going to be included in the ensemble for which the composition is intended. When the tonal picture has been set, the musical contents of the various parts emerge during the course of the work, as described for VERTICAL 1A. Even here the equipment provides the basis for the method of working by making possible the type of musical 'thinking' possessed by very practised composers, enabling them to write for an entire orchestra directly into the score, and simultaneously to 'hear' the sounding result while writing.

Discussion

Adopting Gibson's (1979) concept of *affordance*, the question may be put in relation to the role of the computer in music creation: what are the affordances of the technology and how are they perceived? The participants with experience of playing an instrument obviously have different approaches to music-making than those who do not. This fact seems to be important in explaining why these participants do not use the options of the equipment to the same extent as the others: they simply do not perceive a need to do so! Moreover, the experience of musical training seems to result in more fixed ideas about creating music, which indicates that while instrumental training may be important in the process of realising musical ideas, it can also become an obstacle in the exploration of the options of this equipment. On the other hand, for those who do not have any performing skills and thus need all the help that the equipment can provide, exploration of its possibilities becomes a necessity.

This point provides an important illustration that the construction and design of a sequencer program is based on knowledge and skills in traditional ways of creating music which are transformed into the program by the designer. Thus, the question may be asked as to how different software, not based on traditional transfer of data via a keyboard, might affect the outcome with respect to ways of creating music and how the computer is used. Whatever the prerequisites for music-making are, it can be safely assumed that there is a good deal of variation in the different ways of executing tasks. It might be, however, that other types of software in which the creation of music is achieved in an unconventional way would further diminish the effects of instrumental skill, and thus separate performance and composition to an even greater extent. Hence, such a program would offer a more equal point of departure, as it might force *all* of the participants to use the computer in a more exploratory way.

Although the technology to some extent mediates ideas of how to create music, the computer seems to take on the function of *a tool for realising musical ideas*, and thus being more or less transparent in the creative process. The 'transparency' of the computer might explain why reflections on the computer itself and its function, such as those discussed by Turkle (1984), were not observed in this study. According to Turkle, computers might lead to an escape from real objects to their abstractions. In music it seems to be the reverse: as Ödman (1992) points out, computerised tools involve a shift from representations of music to the music itself.

Different instruments yielded different results depending on their sound, construction, playing technique, and the stylistic associations they give rise to. The computer, though, seems to operate on what might be described as a higher level in a 'media-hierarchy', that is, the different instruments and ways of expressing musical ideas are restricted to the potential of the computer. This was evident in the way some participants used the computer equipment to do 'drawing-sketches', while others chose to 'paint' with sounds. This is not to say that the computer has no limits as a medium for composition, nor that it does not steer the way in which the music is created. However, the stylistic variety of the music in the present study, seems to indicate that the computer is not as controlling either for the ways of creating music, or stylistically, as could be expected according to the general view of the connection between the sounds of synthesisers and ways of working with computers on the one hand, and certain styles and genres of music on the other. On the contrary, it may offer the freedom intended by the choice of the computer and the synthesiser as medium.

In conclusion, all the participants succeeded in creating music. This is in no way a trivial finding, as it contradicts a well established conception of composition as being something that can only be done by a few, specially gifted individuals. The result might thus indicate that with computers bridging the gap between musical thinking and performance, every person should be able to create music (Sloboda, 1988, 1992), an idea confirmed in earlier studies using music technology for composition (e.g., Kratus, 1985, 1989; Folkestad, 1991).

However, the results show that the ways in which music is created varies between individuals, and between different kinds of music. An important implication of this is that school should not teach *the* method of composition, but rather create a context in which pupils can explore their own ways into music composition. The knowledge of different strategies in composition which pupils spontaneously develop on their own, some of which has been presented above, should be of great value to teachers guiding their pupils into the adventures of musical creation. Computers are likely to be increasingly used in music education at all ages, especially for creative activities like composition. Thus, further research in this field will become increasingly important. It has the potential to contribute valuable knowledge for teachers who implement and develop computer based musical activities in school.

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Keynote Address

Music for the Unschooled Mind: Neurobiological and Developmental Processes in Early Music Learning

Wilfried Gruhn

Introduction

Music perception and cognition, expression and affection refer to human capabilities (Welch 1998) based upon neurobiological structures (Gruhn 1997). It develops according to a complex and multifold interaction between genetic potential and environmental stimulation, but is as far as research has shown independent from general intellectual capacities and chronological age. Although, in general, learning is strongly related to formal instruction as in schools and similar institutions, children always learn by any means and nobody can totally restrain them from learning. But does a child predominantly learn from his/her mother? Of course, he/she does, but the child learns without formal instruction. He/she learns intuitively by him/herself within a given social and cultural context. However, how does an unschooled mind respond to perceived musical sound? How does it "think" or "image" musical sound? What is going on in a still developing brain? We all know that in school it may happen that a student gets good marks, but does not understand anything, or a student does really badly in academic subjects, but is perfectly coping with the practical demands in daily life. Guided instruction and true, real, effective learning are not necessarily the same. First, we must make clear what we understand by "music learning" or "learning" in general, and by learning of an unschooled mind in particular. Therefore, I would like to take a brief look at the developing human brain before debating the results of brain research in music and children's music learning.

Let us start with a music example (ME: David's song; Valentina's song). David is a three year old American boy who has attended a pre-school music class for several months where he has been exposed to many songs in any tonality and meter and has developed a broad listening vocabulary, or - in other words - he has developed a mental representation of many tonalities, rhythm patterns, melodic structures etc. so that he can improvise by making use of the embodied materials; he can activate what he already has in his musical mind without any conscious knowledge of that material in terms of verbal (theoretical) names. He images the sound of Dorian and the flow of corresponding rhythm patterns in duple meter in his mind, he supposedly likes it, and therefore he can sing that way. I suppose everybody will agree that in a way David has learned music. Valentina is a three year old Italian girl whose mother is "talking" to her musically. In her musical conversation she uses patterns that she has heard many times before. As in language, she creates new combinations of musical elements which she already owns.

Both children obviously have learned something, but they have not learned the song they sing or the rhythm they chant. They don't imitate from memory what they were taught, rather they make their own use of what they have heard and done many times before in a similar, but not necessarily the same way. By this, children show that they have access to musical representations, that they activate them to generate their own songs and chants. This indicates that learning is not only memory, and memory is not only a storage of ready made tunes or other structures (elements, entities, units), rather it becomes obvious that memory must be referred to interior processes within the brain by which former experiences are reactivated rather than retrieved. Therefore, we must first look at the architecture of the brain itself.

The Architecture of the Brain[1]

The brain functions as humans' powerful central processing station. It is the most complex organ of the human body. Researchers estimate that it consists of about 100 billion neurons (1011 = 100.000.000.000, ie. as many neurons as stars in the milky way) which are complexly wired and strongly interconnected with one another through axons and dendrites so that each of them can communicate with any other neuron via 10.000 synapses.

The phylogenetically oldest part is the brain stem that regulates all vital functions such as breathing, heartbeat, arousal, body-temperature, equilibrium, and homeostasis of body liquids. Phylogenetically younger parts are the cerebellum and hippocampus, hypothalamus and amygdala (as the most prominent parts). The hippocampus is important for memory storage and retrieval, the amygdala for the generation and processing of emotions, the hypothalamus governs autonomous nervous function and the cerebellum processes mainly body equilibrium and accuracy of movements. The thalamus as the gate to the cortex encompasses afferent information of all sensory systems to the cerebral cortex.

The cerebral cortex surrounds and covers like a thin peel of about 2 - 4 mm the deeper parts of the brain. It has an extensively wrinkled and convoluted structure as a result of the evolutionary strategy to enlarge the surface without increasing the space restricted by the skull bone. Flattened out, it would cover about 2200 cm2 (that is the size of 4 sheets of normal typing paper, for comparison: a chimpanzee's cortex would fit on one sheet, a dog's on a postcard, a rat's on a stamp). The cerebral cortex is divided into two hemispheres which equally work together but are specialised by asymmetrically distributed functions. The dominant (never exclusive) location of a brain function in one hemisphere is described by the term lateralization. For example, the lateralization of linguistic skills to the left hemisphere is shown by the large majority of right-handers (about 97%) and left-handers (about 90%) as well. Nevertheless, the cooperation of both hemispheres in such complex tasks as language is obvious: the prosodic elements of language are primarily processed in the right hemisphere (Pihan et al. 1997). Therefore, we must take into consideration that there are remarkable individual differences in the dominance of hemispheres. However, both hemispheres are strongly interconnected by the about 100 million fibres of the corpus callosum. Each hemisphere is divided into four anatomically distinct cortical lobes, the frontal, temporal, parietal, and occipital lobe (Fig. 1). These lobes fulfil specialised functions: the frontal lobe is largely concerned with planning future action and control of movement, the parietal lobe with somatic sensation and body image, the occipital lobe with vision, and the temporal lobe with hearing as well as aspects of learning, memory, and emotion.

The cortex consists of six horizontal layers with different types of neurons in it which are horizontally and vertically interconnected by a dense network of fibres (axons for sending information [efferent neural conduction] and dendrites with spines and synapses for input information [afferent neural conduction]).

At birth, the total number of neurons is already established; but during infancy, the axons and dendrites grow and develop an immense amount of synaptic connections depending on the incoming information (environmental stimulation). After birth, neurons and their connecting fibres cannot regenerate any more if they are underdeveloped, damaged (eg. cut by an accident) or deprived. Therefore, the learning window opens from the very moment when the brain develops its wiring (ie. prenatally as a foetus) and it is most efficient during the first three to four years when the cortex holds its highest plasticity.

The concept of hemispheric dominance and lateralization has changed within the past years. Whereas traditional theories ascribed cognitive functions to one of both hemispheres (eg. music processing to the right hemisphere, abstract faculties to the left hemisphere etc.), the cognitive strategy has become another crucial variable. In music, it can be shown, that listening to a melody in an interval-based manner (which is an analytical cognitive strategy) is primarily

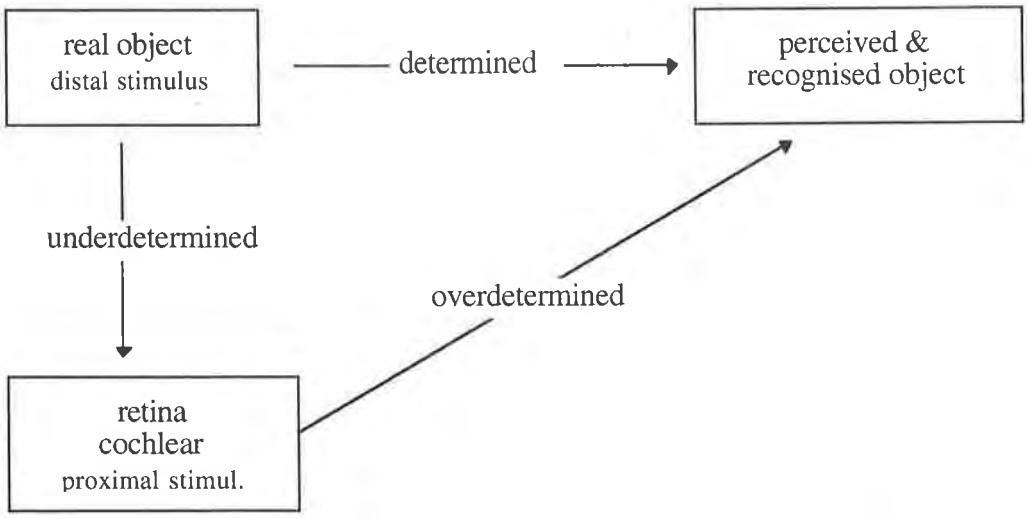
[1] This description follows Eckart Altenmüller in: Altenmüller & Gruhn (1998). "La investigción de la función cerebral y la educatión musical", *Eufonia*, **10,** Barecelona: Graó, 51 - 76.

processed in the left auditory areas, whereas listening in a contour-based manner (which performs a holistic way of thinking) is processed to a greater extend in the right auditory areas (Peretz 1993). Since humans are able to switch from one mode of cognition to the other, a static concept of hemispheric lateralization is not appropriate. According to different strategies and actual demands, neuronal processing networks are distributed over both hemispheres.

Although the neuronal mechanisms of learning are still far beyond clear understanding, some general principles of neuronal plasticity have been clarified during the last years. All information processing derives from neural activities transmitted by synaptic connections. Neurons of similar physiological function are vertically arrayed through all six cortical layers, forming a series of 'cylinders' of about 30-100 micrometers in diameter. Such functional units, called cortical columns, consist of some 10.000 reciprocally wired neurons. Each column is interconnected via dendrites and axons to other columns in other parts of the brain, forming a widespread network which can involve both hemispheres. Whenever peripheral stimulation elicits cortical activity, the different properties of the stimulus are processed in differently specialised columns. In the auditory cortex, for example, columnar organisation allows separated processing of frequency, loudness, or sound direction. Each column simultaneously activates the network of interconnected columns all over the cortex forming a cell assembly. Neurons and columns can participate in different cell assemblies so that networks of cell assemblies overlap. Neurons, which are repeatedly activated at the same time, reinforce their synaptic strength and facilitate information transmission between them (Hebb, 1949). As a consequence, a stabilisation of stimulus-related cell assemblies develops.

But what is processed at different areas in the brain, has to be connected in the mind by the process of perception, which actually is a process of constructing the perceived reality (Fig. 1). Perception means to recognise something to be something. But we must always overdetermine what we perceive to recognise something as what it is. That is, we must relate and connect the differently processed parts of any information and make it meaningful information. That is what learning is all about. It consists of two parts: (1) the development of new representations by establishing more and larger cell assemblies and (2) the assimilation and accommodation (Piaget) of new information through cortical activation and pattern matching by which we give meaning to what we hear or see. By this, we will understand that learning has a biological foundation including neurophysiological conditions (it is based upon the physiological growth of neural connections) and it has a neuropsychological base to stimulate an activity in the learner to give meaning to sensations and perceptions.

Figure 1: Degrees of Determination in Perception



Neuromusical Research

In recent years the investigation of neurophysiological, neurobiological, neuropsychological foundations of music learning and music performance has increased tremendously. New advanced imaging technologies (like PET, fMRI, but also many different forms of EEG, MEG and ERP) opened the opportunity to look into the active brain at work. "Perhaps no other area of music psychology has seen as much advancement since the first edition of the *Handbook of Music Psychology* in 1980 as neuromusical research" (Hodges 1996, 197). There is an increasing fascination for using advanced technologies to learn more about the actual processing of musical sound, of the cortical representation of music, of the high cerebral plasticity which can be used for learning.

As indicated above, learning is not only a physiological procedure, it also effects the brain and causes objective changes. Sergent and collaborators (1992) investigated neural networks involved in musical sight reading. 10 expert pianists were asked to read and perform an unfamiliar Bach fugue while PET-scans were taken. They demonstrated a widespread activation of visual, motor, and auditory areas in both hemispheres. In another PET study (Fox et al. 1995) five expert pianists were scanned under three conditions: rest, performing scales with both hands, performing the third movement of Bach's Italian Concerto from memory. The results reveal considerable differences in the laterality of somato-sensory and somato-motor activations involved in the processing of the respective task. Another PET-study has shown, that music imagery and real perception of sound shares a great deal of cortical activation. Even when a motor skill is only imagined, the subjects generate motor activation (Zatorre et al. 1996).

More interestingly, Schlaug et al. (1995) demonstrated that there is an increased size of corpus callosum in musicians. That indicates, that "early and intensive training in key and string players may facilitate increased and faster interhemispheric transfer in order to perform complex sequential bimanual motor sequences" (Schlaug 1995, 1048). In a recent study, Pantev et al. (1998) found an increase of the tonotpic representation in musicians. There was a significant difference referring to the strength of activation and to a larger extension in the planum temporale for piano tones compared with pure sinus tones. Those findings suggest a use-dependent representation and also raise the possibility "that musical experience during childhood may influence structural development of the auditory cortex" (Pantev et al. 1998, 813). Comparable results are demonstrated by Elbert et al. (1995) for an increased cortical representation of the fingers of the left hand in string players, and by Pascual-Leone et al. (1995) who used a transcranial magnetic stimulation to map the cortical motor areas for the long finger flexor and extensor muscles. They found a significantly larger extension in the trained compared with the untrained hand. Johnson & Petsche (1996) have examined interhemispheric coherences in a listening task and found that musicians have significantly higher coherence values. My own research deals with the effect of music learning on auditory activation patterns (Gruhn 1997; Gruhn & Altenmüller 1997).

Does Neuromusical Research Support Transfer Effects?

The above investigations document a tremendous effect of early training on the cortical representation and the potential of cerebral activation. It seems indisputable that music effects and affects the brain. Therefore, journalists and some researchers have speculated and music teachers have become very enthusiastic about the possibility that music could have a transfer effect on students' intellectual development in general. Music training, however, primarily leads to and helps developing a genuine musical intelligence. But along with the growing interest in brain research it has also become very common to refer to experiments and investigations that supposedly indicate how music affects humans' intellectual capacities. But does that support the common opinion that music makes students smarter?[2]

The most striking results are referred to as the so-called Mozart-effect on spatial-temporal reasoning (Rauscher et al. 1995) and the keyboard training effect (Costa-Giomi 1997; Rauscher

[2] See the recent discussion on that issue in *Psychology of Music*, **26**, 2, 1998, 197 - 210

et al. 1997). In the first experiment, it could be demonstrated that a section of a Mozart sonata caused an increase of 62% on solved items of a spatial recognition test whereas silence (14%) and a mixed group with different material for every day (11%) caused a much smaller and non-significant effect; but that was only true on day 2 in a series of sessions over 4 days, and the effect was stable only for 10 minutes. The reason might be that a particular type of music (represented by Mozart) which is characterised by rhythmic and melodic correspondence which encompasses few unexpected irregularities and changes (typical for the structure of Mozart's musical periods) stimulates those firing patterns of the activated brain areas which are also responsible for spatial-temporal reasoning. Listening to that kind of music "helps 'organise' the cortical firing patterns" (Rauscher et al. 1995, 47) and acts as an effective stimulation of neural activation within a particular firing pattern. But that is strictly bound to that kind of stimulation and functions as a momentary "exercise" for the brain. No long-term effect could be shown. Gromko and Poorman (1998) conducted an experiment with 34 preschool children which has shown that at least music training holds the age related gains in spatial-temporal tasks steady for older pre-schoolers whereas without music training the gains decrease significantly.

The piano training of 10 - 11 year old students (Costa-Giomi 1997) or pre-school children (Rauscher 1997) revealed a significant effect in spatial and verbal abilities compared with singing instruction, computer work, or no instruction (Rauscher). Here, we observe a training sequence of motor skills. From linguists we know that any semantic development follows a sequential order of speech movements produced by the voice. Just recently a study of Warren Brodsky (1998) has shown the importance of the phonological loop between aural and oral production for the development of musical imagery. In the above mentioned studies, only the motor component of a highly complex pattern is trained, but it remains open whether this training is bound to music or can be replaced by other tools appropriate for finger pattern training which might cause the same effect.

Maria Spychiger's longitudinal study (1995) conducted in Swiss schools is quoted frequently. As a result of her carefully elaborated study, Spychiger has good reasons to be reluctant in drawing too early conclusions. She summarises that "the results of the Swiss study are rather poor; only some aspects are remarkable: first that the subjects maintained their achievement in sciences although they got a reduced number of lessons. This effect, however, is not to be seen as strictly connected with music education" (79). She knows that "the better the methodological treatment of the study is accomplished, the less significant is the identification of extra-musical effects" (42). Until now I have neither seen nor heard of a proper study that profoundly demonstrates the often stressed transfer-effect of music on other disciplines. On the contrary, all psychological studies on music aptitude and musical talent state that there is no significant correlation between intelligence and music aptitude. Just recently, an ongoing German longitudinal study performed a similar experiment with elementary school children (Bastian 1997). But in this case, a real control group is missing. It must be scrutinised if it is true, that only music causes an effect on behavioural and intellectual attitudes whereas drama or sports or other activities fail to evoke this effect. This, however, was never done. Rather, it is obvious that special care and treatment of children in an experiment with especially trained and selected teachers will have an effect on the children's achievement. But that is not an effect of music rather it is a care effect.

Music for the Unschooled Mind

With respect to the neurobiological foundations of learning we now can summarise that music learning is the process by which we develop and differentiate (extend) mental representations, which are a prerequisite for the possibility to activate already established meanings of sounds; furthermore, that learning is most efficient during the time of highest plasticity of the brain, ie. during the period when the neural network is still growing.

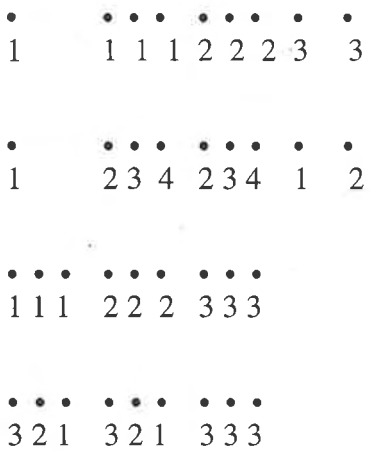
More neuromusical research will be needed to explore what kind of learning strategy will support the growth of synaptic connections, will enhance the formation of cell assemblies, will increase the auditory representation, and will strengthen the interhemispheric coherences. But now we should ask how children do represent music and musical skills beyond this

sophisticated view on music learning. How does the unschooled mind process music? How can we establish genuine musical representations?

We know that children always learn. However, the most important issues we have learned (like to walk, speak, think) have been developed spontaneously or intuitively by early exposure and practical experience, normally without any formal instruction. Any intended action causes an information transmission through efferent nerves and generates a feedback by afferent nerves. This loop of afferent and efferent information processing frames the loop of perception and production which is known as "phonological loop", when perception controls action (performance, sound production, articulation), and action conducts and modifies perception. This loop of action and perception is crucial for learning. Here, the interesting question is when and where to enter the spiral. To approach this question we should first look how music is represented in a naive child's unschooled mind.

As shown by Bamberger (1982), Upitis (1987), Gromko (1994), and others, children have a highly differentiated understanding of musical rhythm reflected by their notations. These may function as a window to their mental representation. If they get numbers and symbols, they find convincing solutions for their different mental images of rhythms depending on whether they focus on groups consisting of one quarter note plus two eighth notes or on the eighth notes plus the quarter note, ie. whether they interpret the rhythm as opening with an anacrusis or without (both of which makes sense rhythmically):

Figure 2: Different Notations (perceptions) of the Same Rhythm (According to Bamberger 1982)



Although children do not have access to theoretical concepts, they immediately realise that the running beats are loaded with different weight - some are heavier than others. They instinctively group (or chunk) elements together and give meaning to a series of pulses. This refers to a typical figural representation (Bamberger 1992) when listeners group isolated elements and form figures which they can only name by vernacular names or numbers. But when we present songs with words, children focus on the story of the song and neglect the pitches (Barrett, 1998) which, on the other hand, does not indicate a retardation of pitch perception or production. Lyle Davidson and Lawrence Scripp (1988) report an experiment with 6 year old Emily who drew a picture of water, clouds, and a boat representing the song "Row, row, row your boat" when she was asked to put it on paper. After she was asked "to read the song" from the picture, she immediately turned the sheet and began drawing "notes that belong in her music book" (Davidson 1988, 204).

Jeanne Bamberger (1992) worked with a student (Jeff) who experimented with Montessori bells. When he tried to set up the bells for "Twinkle, twinkle little star", he strictly followed the order of tones according to the melody. Each bell represented a particular position and its special function in the song (opening, middle, closing, bearing a syllable of the text etc.), so

that he always needed one bell for one tone. He did not realise that the bells have an individual property called pitch. Jeff's attention was only occupied by the tune path, the series of words and tones in a row no matter what pitch it is. That clearly demonstrates that children focus on different features. "Same" and "different" are important categories to learn. First, children only focus on one aspect at the same time. All their theories of "same" and "different" refer to this single aspect. When they differ from our understanding of "same" and "different", it does not mean that they do not have a clear theory on it - it only says that their theory is different, it is the theory of an unschooled mind, but it nevertheless is a theory - or let us say more precisely: a cognitive schema. The naive cognitive schemata have to be changed by extended experiences which fit or do not fit with former experiences. Neurobiologically, new synapses, new connections have to be built. By this, children develop a complex representation, they learn to correlate several cell assemblies for the processing of a sound so that they can recognise it as something (eg. as an anacrusis). Learning is like building as many pathways as possible in the mental map to make use of while listening to or playing or even thinking of music.

The processing of music in the unschooled mind is neither primitive nor bad nor poor, it only has not been developed yet and therefore is not strictly musical, ie. there is not yet a genuine musical representation that represents music internally as meaningful information - meaningful in terms of context, of relations within pitches and duration's, rhythm and tonal patterns, but not in terms of extra-musical semantics (like Peter and the Wolf). All music learning should be concerned with the development of genuine musical representations.

What Can be Done to Develop Musical Representations?

Children in a very early age discover their environment by body movements. As adults we focus on time and space, represented by numbers and symbols, we measure and count. Children, however, primarily focus on weight and flow. Rudolf von Laban observed the interaction of time and weight and space and flow in practicing dancers. Research (Hicks 1993; Reynolds 1995) has shown that children as young as 10 months imitate continuous flow with their body movements. Music training that involves movement as a means of practice also improves children's perception (Lewis 1988; Morrongiello et al. 1990; Mueller 1993). Spatial as well as musical intelligence both depend on extended sensory motor experiences (Gromko & Poorman 1998, p. 174). That connection is well documented by many authors (see Gromko & Poorman 1998, p. 174). Moreover, children who perform vocal responses expressively are those who have demonstrated continuous flow (Reynolds 1995). As seen in children's music drawings, weight is a primary factor of recognition and orientation. Here, the embodied representation of weight can be linked with musical experience which, then, can be transformed into a metric representation. The figural representation by embodied weight turns into a formal representation of meter and rhythm.

In my own research (Gruhn & Altenmüller 1997, Altenmüller & Gruhn 1998), we could clearly show that and how musical representations - reflected by brain activation patterns - differ depending on the learning mode. In a longitudinal study we formed three groups of learners, two experimental groups and a control group. The experimental groups were treated differently, so that one (L2) could develop musical representations by using the benefits of the phonological loop, the other (L1) underwent the same learning procedure, but we suppressed any option for a phonological loop. After several weeks the subjects revealed significantly different activation patterns.

The results of that study initiated another longitudinal study where a learning strategy for building up musical representations is applied to very young pre-schoolers based upon basic principles of Gordon's learning theory (Gordon 1990). I would like to just briefly refer to that *Young Children's Music Learning* project where children from 5 months up to two years of age participate. All children are guided informally (with no formal instruction) to develop musical representations (Gruhn 1998). As "instruments" ropes and hoops, balls and scarfs, trampoline and tambourines are used as a means to experience figural representations of weight and flow as a first step towards building up figural musical representations. Everything is connected with body experience, any sound which is perceived aurally is first produced orally. By this, we

establish a phonological loop which is essential for music learning. In this project we can only use observational methods to monitor the children during their learning activities and analyse the observed data. The purpose is to describe the sequential steps of music learning in a setting of informal guidance. In addition to this, more insight into the neurobiological foundations of music learning is needed to enhance our understanding of learning and as a consequence, to effect our music teaching.

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Keynote Address

Music Education Research: A Tripartite Enterprise

Harry E. Price

Introduction

It is a pleasure to be here with you to discuss two things that are near and dear to my heart, the research model as a path to enlightenment and the *Journal of Research in Music Education (JRME).* The research I will share with you today is drawn from the over 55 studies published in *Music Education Research: An Anthology from the Journal of Research in Music Education* (Price, 1998), which was released in April 1998. These studies deal with three critical aspects of Music Education: children, teaching, and music. Each study is worthy of its own dedicated session; however, here I will only cover a sampling that is especially relevant to this, The Second Asia-Pacific Symposium on Music Education Research.

The selection of studies in the *Anthology* was research-based. It includes 37 articles researchers felt "have had the greatest impact on the field, have withstood the test of time in importance to the profession, and/or have added significantly to the body of knowledge about the effects of music and music teaching" (Price & Orman, 1996, p. 62). It also includes 11 of the 15 articles cited most often in 922 descriptive and experimental studies (Schmidt & Zdzinski, 1993).

The *Anthology* studies were all published in *JRME,* which has included more than 1000 studies, approximately 35% of which had children as participants (Yarbrough, 1984). Before presenting the literature, I would like to provide an historical context. The *JRME,* established in 1953, may be the first and longest standing music education research journal. The earliest study that I will discuss today was published in 1963. In 1963, the *Bulletin of the Council for Research in Music Education* was established, the *Journal of Music Therapy* published its first issue in 1964, *Psychology of Music* in 1972, *Australian Journal of Music Therapy* in 1990, and in 1993 both the *Boletin de Investigacion Educativo-Musical* and *Research Studies in Music Education* were established.

In a hallmark and often-cited study carried out over 35 years ago, Petzold (1963) examined the auditory perception and musical development of approximately 600 children in grades one through six (ages 6 to 12). In this and previous work, Petzold analyzed over 450 songs for tonal configurations and over 1000 songs for common rhythmic patterns. Using this information, he constructed tests to examine auditory perception of short tonal configurations, consistency of response, rhythm's effect on auditory perception of short tonal configurations, and a test that included complete 4-measure phrases.

Regarding auditory perception of short tonal configurations, he found that each higher grade responded better, there were marked differences between responses from children in lower and upper grades and musical experience was a significant factor in response accuracy. The introduction of rhythmic elements did not appear to significantly affect melodic perception as scores on the two tests were highly correlated at each grade, ranging from .92 to .96. Musical experience was not a significant factor in scores on the rhythmic test.

Results of the test of consistency of response yielded no consequential differences among grades or between genders. They did however demonstrate that children's responses across multiple trials were consistent, as did their responses on his 4-measure-phrase test. In other work by Petzold (1969), he summarizes findings of a longitudinal study and a series of one-year pilot studies on auditory perception of children. The longitudinal study followed students for four, five, and six years. Testing procedures were similar to those used in previous work (Petzold, 1963). He found that age might be related to some

increasing disparity between boys' and girls' auditory perception. There appear to be ongoing changes in auditory perception, as evidenced by performance, in children ages 6 through 8 reaching plateau after that. This suggests that younger ages may be the most critical in musical development and learning. Children's relative auditory perception did not change over time. He also found that learning short musical phrases without assistance was quite difficult for the students, especially younger ones, and auditory perception did not appear related to learning.

Petzold's 1969 report highlights the need for caution in equating perception and performance; indeed, Geringer (1983) examined this. Preschool and fourth-grade children (N=144) were given a pitch-discrimination test in which they identified whether the second tone of a pair was the same, with the intervals ranging from a tritone to unison. They also performed a vocal pitch-matching test in which they sang back a simple melody. His findings are intriguing. There was a significant difference between the two age groups, with the older children matching pitch more accurately; however, there was no significant difference in pitch-matching among three pitch-discrimination ability groups. Indeed, there was a "relative lack of correlation between pitch-discrimination and vocal pitch-matching abilities." In other words, while age may affect the ability to match pitch, it appears to bear little, if any, relationship to pitch-discrimination. This distinction would seem critical to anyone working teaching or carrying out research in music education. Equating pitch-matching to pitch-discrimination may be invalid.

In her 1964 study, Marilyn Pflederer [Zimmerman], attempted to apply Piagetian theoretical concepts published in the 1950s and 1960s to children's discriminations in music as they relate to development. She examined 5- and 8-year-old children's abilities to conserve meter, rhythm and melody. She scored responses for accuracy and had students elaborate on their responses, thus employing both quantitative and qualitative methodologies. She found that "eight-year-old children were [generally] better able to conserve meter...and the tonal and rhythm pattern...than were the five-year-olds." Answers of the five-year-olds "were indicative of preoperational thought," and those "of the eight-year-old children reflected the intermediate stage of conservation." She provided some excellent implications for music education and suggestions for further research that are still valid.

An examination by Hair (1981), of children's discrimination and abilities to communicate verbally, focussed on linguistic skill development and music perception. The musical discriminations included were high, low, loud, soft, fast, slow, sung, harmonized, parallel minor, and rhythmic change. Children in grades two, three and four were asked to write a word that "tells how the music sounds." Hair found that when the children correctly described the musical concepts being demonstrated, they used terminology consistently for loud, soft, fast, slow, high, low and sung. Harmony, minor and rhythmic change stimuli were less consistently named; success in these items may have been related to musical training. She also found that students who scored higher on an achievement test tended to use more words that were correct.

Sims (1991) built on work by Petzold, Pflederer [Zimmerman] and others in examining the concept of decentration and relationships between child development and musical behaviors in 4- and 5-year-olds. She used short-term instruction designed to teach the children to respond to fast/slow and smooth/choppy. The posttest consisted of labeling and movement-to-music tasks that required single and double discriminations. Since we are in Australia, I ought to mention that one of her movement tasks was a kangaroo hopping to indicate the musical characteristic of choppy. There was a significant teaching effect and the type of discrimination was significant. Essentially, these 4- and 5-year-olds were quite capable of making and modeling the single-discriminations of choppy/smooth or fast/slow and the instruction group was better able to do so. However, all children had difficulty when double-discriminations were required. According to Sims, this is "consistent with Piaget's theory—That young children tend to center on only one aspect of a stimulus at a time." This article included another study that replicated some of the procedures, with the

addition of singing tasks in lieu of movement, and had children ranging in age from 2 years 9 months to 5 years 11 months. The results replicated the first study, with the additional finding that older students scored higher.

According to Sims, the data indicate "that most young children are not ready for music listening tasks requiring attention to more than one element at a time." Her suggestion may apply to Costa-Giomi's (1994) comparison of 223 American and Argentinean 4- and 5-year-olds' abilities to recognize chord changes. Children were taught to respond to harmonic changes in three 15-minute lessons using aural and visual stimuli of a keyboard. The students were then asked to identify when a harmonic change occurred while listening to accompaniment with melody or accompaniment alone. The principal findings were that there were significant differences in the accuracy of responses age and stimulus type. The 5-year-olds were better able to identify when a harmonic change occurred than were 4-year-olds, and all children were better able to identify the changes when harmony was played alone than when accompaniment was played with melody. These results suggest that young children can perceive basic harmonic changes, but the addition of melody makes the task considerably more difficult.

Now we move to research on teaching and its impact on children's responses. Forsythe (1977) examined the relationship of classroom activities to attentiveness. He carried out 262 observations in 11 teachers' classrooms in grades K-6 over the period of an academic year. First, I should mention that in a previous study, Forsythe (1975) found that students are significantly more attentive in music than in other classrooms. In this follow-up study, he found that the children were least attentive during transition periods, or what he termed getting ready, followed by teaching. Both of these classroom activities are passive for the students. An ANOVA yielded significant differences in attentiveness among activities (teaching, singing, listening). The classes were grouped according to emphasis on different musical experiences--singing, playing instruments, creating, listening. Students were most and least attentive in the classes that emphasized singing and listening, respectively. Even within these groups, there was a significant difference among teachers, pointing to the conclusion that both activity and individual teachers are important.

Teachers tend to emphasize verbal instruction and this appears to yield the most off-task after getting ready. The teacher's goal would seem well served to emphasize active participation. This is further supported by the findings of Yarbrough and Price (1981) in secondary school ensemble settings, who also found a significant relationship of off-task to nonperformance (passive) time and teachers. Teacher eye contact was also significantly related to off-task.

Two years after Forsythe (1977) we find a study (Wagner & Strul, 1979) that examined teaching time in a slightly different manner. This work compared the use of teaching time among experienced teachers, teaching interns and undergraduate students. Experienced teachers spent significantly less time giving directions, or getting ready. As you may recall, Forsythe found this activity to yield the most off-task. Experienced teachers appear more efficient in transitions.

In 1991, Standley and Madsen demonstrated another means of differentiating teaching expertise. They had undergraduate freshmen, juniors and preinterns, and experienced and expert teachers watch teaching excerpts and write what they saw. The responses were scored for accuracy of factual and inferential content. They found a significant difference among groups' scores. Each group scored higher than the previous group, freshmen through expert. It would appear that both education and experience contributed, since experts scored significantly higher than experienced teachers, who scored significantly higher than preinterns who were significantly better than freshmen and juniors. This task differentiated among differing levels of music teaching expertise and careful consideration needs to go into factors that influence teacher preparation and children in music settings. One such factor is the use of sequential patterns of instruction in music. This concept represents a continuing line of research of 20 years. It was first written about in music

education by Yarbrough & Price (1981) and experimentally supported in Price (1983). Sequential patterns, in the simplest recommended form, is that of presentation of a musical task, provision of opportunities for students to interact with the task, and appropriate teacher feedback.

In a 1989 study (Yarbrough & Price), 79 rehearsals, led by undergraduates and band and choral directors, were examined for use of sequential patterns of instruction in music and their components. Band and choral directors used a modest amount of time in complete patterns. They spent similar amounts of time giving directions (getting ready) and providing musical information (instruction). As you may recall, experienced teachers spend less time in transition than do novices (Wagner & Strul, 1979) and time spent giving directions appears to be less effective than other music activities when student attentiveness is examined (Forsythe, 1977). It would seem that use of sequential pattern of instruction for effective and efficient teaching might be worthwhile. Consequently, an effort to teach use of sequential patterns was undertaken in a series of three studies (Price, 1992). These studies focussed on providing clear operational definition and opportunities for prospective music educators to observe themselves on videotape and modify their teaching. This line of inquiry demonstrated that use of complete sequential patterns of instruction in music could be systematically taught. Within this context, participants also increased the amount of feedback they gave and its specificity.

No systematic inquiry in Music Education would be complete without the examination of responses to music. Twenty-five years ago, Greer, Dorow and Randall (1974) collected data regarding behavioral preferences of children in nursery school through sixth grade. Children were presented with the option of listening to rock top twenty, symphonic, classical piano or Broadway show tunes music. The first choice for all students was rock and their preferences for rock music increased with each grade level. With advancing age, they also chose to listen to less nonrock music and there was a notable shift from third to fourth grade.

Albert LeBlanc has spent more than 20 years carrying out research in the area of children's musical preferences; two of his studies are included in the *Anthology.* His first work in this area was published in the *Journal of Research in Music Education* in 1979, in which he includes a version of his proposed model of sources of variations in musical taste, which he presented previously at the XIII Congress of ISME held in London, Ontario in August 1978. Fifth-grade students (N=278) participated in his study of music opinions. In keeping with the findings of Greer et al. (1974), he used other generic styles to compete with rock music. He varied tempos, performing mediums among excerpts. The six excerpts rated above five on a 1 to 7 scale were examples of easy-listening pop, rock, ragtime, Dixieland, band march and country and western/bluegrass, and they all share a clearly perceptible beat. These can be said to be appropriate critical competitors and suggests that rock is not the only style that may receive a positive predisposition on the part of children. The classical instrumental music excerpt, "Gavotte" from Prokofiev's *Classical Symphony,* was rated 3, with 4 being a neutral rating.

LeBlanc extended and refined his work with his 1981 study. In it, he used fast and slow vocal and instrumental examples within the generic styles of rock/pop, country, older and newer jazz and art music. Fifth-graders again rated rock/pop highest, with country second, and art music being last and vocal being rated lower than instrumental music. He notes that higher rated styles are those favored by broadcast media and peers, which fits well in his model. Style was the most important factor in student's ratings with tempo having a moderate relationship. Generally, students rate faster pieces higher. In his conclusions, LeBlanc suggests, "teachers who want to encourage a positive listener response to jazz and art music should introduce fast instrumental examples first and progress to slow instrumental, fast vocal, and slow vocal examples."

While we know that children have certain tastes in music, their selection of music can be influenced (Greer, et al., 1973). Fifth-grade children were presented jazz, electronic music

and music classics provided by clinician-performers or they listened to the same music under high and low approval situations. Pre- and posttests consisted of number of seconds children chose to listen to each music among electronic, rock and jazz music, music classics and white noise. Pre/posttest music was not the same as that used in the treatments. On the posttest, there were no significant differences found between listening and clinician-performers groups; however, there were significant differences between high approval and low approval groups, with electronic music and music classics receiving significantly more listening time on the posttest by the high approval groups. High approval treatments had a favorable effect on music selection; indeed, this is especially notable since the music was the same style but different pieces from those used in treatments.

In a replication and extension, Dorow (1977) examined effects of high and low teacher approval/disapproval ratios on music selection and concert attentiveness. Again, students who were taught under high approval situations increased listening time and those under high disapproval spent less. These effects generalized to concert attentiveness. Teachers have power to influence students' actions in music.

Patricia Shehan Campbell (1985) investigated the impact of teaching in "Transfer of Preference from Taught to Untaught Pieces of Non-Western Music Genres". She taught sixth-graders four non-western songs from four ethnic regions in five weekly 35-minute lessons. Students listened to, sang with and without recordings and played simple accompaniments. She administered a pre/posttest opinion test in which students listened to songs that included a taught and similar untaught piece from each ethnic region. Scores of taught and untaught pieces were similar on the pretest; however, there were significant differences on the posttest. Taught pieces gained favor, but this change did not transfer to untaught pieces. These findings both support and refute common thinking in the profession. To quote Shehan "the expectation that study of one representative piece from a style will impact upon interest in other stylistically similar pieces in not supported." Conversely, it would appear from Shehan's study and works by Greer, et al. and Dorow, that teachers can have an influence. The impact is likely influenced by pedagogy in combination with the music.

While teachers can influence music choices, music has the power to affect human behavior. This point is often discussed and has some empirical support. In the *Anthology,* are two oft-cited studies that investigated the power of music as reinforcement for other tasks. Madsen and Forsythe (1973) examined the use of music listening as a reward in sixth grade. The amount of time students were allowed to listen to music was earned based on correct responses to mathematical problems. The music was selected based on information provided by students. There were four groups: contact-control, math games control, dance- and earphone-listening. After one week, there was a significant difference in correct responses among groups. Listening groups were significantly different from contact control and math games groups. Contingent music listening was effective; these results are one demonstration of the power of music.

Extending this line of inquiry beyond students listening to music of their choice, Madsen (1981) investigated use of academic rewards for correct mathematical responses. In this instance, third-graders earned tokens for correct mathematical responses and were allowed to exchange them for books or televised music lessons. Students' mean correct mathematical responses rose considerably when the book contingency was put in place and then rose a little more when TV music lessons were used. Students gained music listening skills in direct relationship to time spent viewing music lessons. Music lessons were used as rewards for correct responses in mathematics. Everyone won because mathematics and music were both served.

In a study of considerable importance to music research, for both its methodology and results, Standley (1996) examined the reinforcement power of music in education and therapy through meta-analysis. Since 1984, there have been around 2000 meta-analyses,

but Standley's may be the first one in music education and one of the first in music. It included 208 variables in 98 studies that used contingent music for educational and therapeutic objectives, including academic, social, physical rehabilitation, social interaction, stereotypical and work objectives ranging from mathematics to body movement variables.

The results of Standley's massive study are quite conclusive. Music has been demonstrated to be powerful; its effects are quantifiable. When used contingently, music can change behaviors in the direction desired, increase or decrease. The "effects of contingent music are profound, can be creatively designed, and are applicable across a wide variety of educational...endeavors." She lists varied and creative uses of music, and in her discussion notes that there is little empirical evidence to support the contention that using music as a reinforcer results in a loss of intrinsic value.

Music Education research, to be complete, must include three aspects: the child, the teacher and the music. The study of any facet of these three strengthens our understanding, but requires all of these for enlightenment. We need to continue our pursuits to have a sense of what a child can and ought to be able to do. We need to continue to study the teacher and teaching process to better serve our discipline. Finally, we must never forget the complexity and power of music. Love of children, teaching, music, and systematic inquiry are why we are here.

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Keynote Address

Tuning the Mind in Music Education

Robert Walker

Introduction

It is generally accepted that musical practices are culturally determined, and that the particular musical sounds we each make and respond to most sympathetically and readily are those of the sound culture we grew up in. Certainly, there are no genes or chromosomes in which we can locate innate embedded specific cultural musical sounds or structures, but we can claim that all humans have a biologically driven proclivity to acquire and express themselves in some kind of musical behaviour, and this means the particular behaviour and sounds of the culture they were nurtured in. This is not to say that one cannot learn and acquire the musical behaviours of cultures other than one's own, but it is to claim that the young children who come into our kindergartens will almost certainly have been enculturated into the particular musical culture of their environment, and this may well be something quite different from the musical culture we teach in the classroom. In other words, the music we teach in schools may well be rather like a foreign language to most children in that it might have little connection with the general auditory or the specifically musical experiences on which they were nurtured prior to going to school.

The Environment, Musical Taste and Achievement

All normally functioning children come to formal music education in Kindergarten with a great deal of musical and sonic experiences encoded in their neural pathways.

It could be said there are two basic types of influence which operate: perception of the sonic environment, and the consequent mental responses and effects. One concerns the sonic world the child inhabits with its daily mixture of home and people sounds, traffic, electronic media and weather sounds, anything which makes a sound in fact. The other relates to the musical culture into which she has been born and its predominant ethos, practices, expressions, usage, and particular rhythmic, timbral, melodic and harmonic sounds. The first is a conglomeration of auditory information from which the child has to learn to extract some kind of sense, but the second is the more subtle in that absorbed and learned mental influences from cultural sources come into play as she interprets the sound world she inhabits. It is from the second source that the child gets her sense of musical value and worth, delight, emotion, expression, and meaning. The details of the various sonic configurations provide the auditory metaphors and tropes for such meanings and interpretations, indicating that the type of sound world our students grow up in matters a great deal to the music educator.

The inter-relatedness of sound perception and mental interpretation was demonstrated in an interesting empirical study by, Diana Deutsch (1998) from the University of California at San Diego who demonstrated empirically a connection between different dialects and practices of spoken English and melodic perception and interpretation in music. The comparison was between children brought up in England speaking a particular dialect of English and comparable children in the USA speaking a dialect of American English. Different spoken dialects induced different perceptions of melodic intervals. But we can extrapolate to more specific contexts.

A six or seven year-old child from, say, a family in London, England, whose parents and older siblings are musical will almost certainly have acquired a great deal of auditory experience of the historical music of England and western Europe. Another six or seven year-old child from, say, the American South will, similarly, have acquired an equivalent amount of musical experience but, let us speculate, of the very different musical sounds of the American South with their predominantly country, blues, and gospel style influences. And if there are socio-economic differences involved the respective auditory environment of each child is likely to be profoundly affected.

Such two healthy, robust children will each have a complex set of millions of established neural pathways formed by their respective musical and sonic experiences. But these pathways will each reflect quite different musical and sonic environments, as well as different values and environmental conditions. We can trace the precise nature and content of each quite readily and demonstrate that their differences will be as stark and contrasting as the spoken and written language differences between the two. Embedded in both the language and music traditions of each of these environments will be the rich legacy of the respective histories and traditions of each, and the child born into and growing up in each environment will absorb its linguistic and musical behaviours as well as their subtle meanings and cultural references.

We can even compare two specific examples - Sir David Willcocks and Elvis Presley - which will highlight the importance of environment on development and subsequent achievement. In some ways these two performers can be compared in that they both achieved the height of their national and international fame during the 1950s and 1960s, and each contributed something unique to their respective musical cultures by doing something musically original, even though each based their musical performance on well established practices. Significantly for this comparison, each profoundly changed the nature and direction of their respective musical traditions.

David Willcocks, born in 1919, was featured last year in the MENC Journal "Teaching Music", (June, 1998, Vol. 5 # 6) as he conduced a master class with the Phoenix Boys Choir in the USA. As we probably all know, Sir David Willcocks was the Director of Music at Kings College Cambridge from 1957 - 1974, during which time the choir became world famous through its recordings and radio broadcasts. Following this, Sir David became Director of the Royal College of Music in London and one of the key figures in the English musical scene. He explained in his interview for the MENC journal that he began as a chorister in Westminster Abbey choir at the age of 9 and from then on he was involved in English cathedral music. But in order to be accepted into such a choir, it would be necessary to have had a certain minimum exposure to such music and to have had music instruction from an early age. Knowing the ropes, as it were, was certainly more important than possessing an exceptionally beautiful singing voice. Willcocks' family were well-off, middle class, and well educated. The choice of Westminster Abbey Choir School, one of the most exclusive of England's cathedral schools, indicates their socio-economic status. Every day from the age of 9, he explains, he was exposed to music - Handel, Gibbons, Byrd, Purcell, Palestrina, John Blow, etc. - the great names of the English and European church music traditions. After completing his education at the Royal College of Music and Kings College Cambridge as organ scholar, it was just a natural thing for him to go on to be a cathedral organist and then Director of Music at Kings College Cambridge.

The point is that without such a background such a career and life would be impossible. Willcocks' unique contribution was to change the rather stuffy and remote style of English cathedral choral music and to influence the style and technique of singing in choirs world-wide. He also introduced a great deal of avant-garde music into the religious repertoire through his work at Cambridge and with the London Bach Choir.

Elvis Presley was born in East Tupelo, Mississippi, in 1935. We cannot call him Sir Elvis, but he assumed a higher rank when he became known as the King. Anyhow, he moved to Memphis when he was 14, and it was there that he made his first recordings in his early 20s which made him world famous. His contribution was unique because, as many commentators have said, he was a white man who sang black music with the authentic sound. At the age of ten, Presley showed his incipient ability when he won a prize in a talent contest sponsored by a radio station at the Mississippi-Alabama Fair and Dairy show. His proud parents bought him a guitar to encourage him. His family were poor and his first musical experiences were at the Pentecostal First Assembly of God Church in Tupelo, where an ecstatic singing practice was the norm, similar to that of many black churches. He listened to radio broadcasts of white country-western music, to the Grand Ole Opry from Nashville, to popular black music by Billy Eckstine or the Ink Spots, and to authentic black country-blues singers like Big Bill Broonzy and Big Boy Crudup (Hamm, 1983). When he moved to Memphis he was in a city with a

famous and distinctive Blues tradition where the likes of Howlin' Wolf, Sonny Boy Williamson, B. B. King, and Rufus Thomas were the contemporary performing musicians. Memphis had a history of blues going back several decades and it was on the theatre route of travelling blues singers who played at theatres along the Mississippi and eventually up into Chicago. Memphis was one of the great music centres of the American South.

King Elvis's first hit was "That's all right" in 1954, to be followed by songs which gained astounding international popularity. The impact he had on audiences in the late 1950s was described by country singer Bob Luman:

> "This cat came out in red pants and a green coat and a pink shirt and socks, and he had this sneer on his face and he stood behind the mike for five minutes, I'll bet, before he made a move. Then he hit his guitar a lick and he broke two strings. Man, I'd been playing for ten years and hadn't broken a total of two strings. The audience was screamin' and faintin' and then he started to move his hips real slow like he had a thing for his guitar" (Hamm, 1983, p. 397).

Despite the fact that Pablo Casals, the cellist, called his music "poison put to sound" and the USA *Music Journal* of January, 1961, labelled it "a disgrace to music" (Hamm, ibid), King Elvis and rock have gone on to become totally accepted by all social classes and most cultures, and to become perhaps the most important influence on each successive generation of young people since the 1950s.

In a smaller, but perhaps no less important way, the broadcasts of the sound of Willcocks' choir from Cambridge have, since the late 1950s, become associated with Christmas for millions of people across the world, and almost rivals that of Bing Crosby singing Irving Berlin's "White Christmas" in the 1942 film "Holiday Inn". For many, Christmas begins when they hear the boy soloist at the west end of King's College Chapel singing "Once in Royal David's City stood a lowly cattle shed, where a mother laid her baby in a manger for his bed".

As a sort of parallel, the words of one of Presley's hit songs from 1956 became a sort of battle cry for the young who felt oppressed by the restrictive and narrow minded old "fogies" who ran their schools, universities, work places and churches:

> Tutti Frutti all rutti,
> wop-bop-a-loom-bop-a boom-bam-boom.

These descriptions of two very different individuals who have had a major impact on the popular consciousness relating to two quite different styles or genres of music, each from very different socio-economic environments and English speaking cultures, illustrate an important issue for music educators. And this concerns the role and importance of environment in the formation of both our linguistic and musical concepts up to Kindergarten age and the very close relationship between what the child has been enculturated into and the musical style and content the child eventually accepts and excels in.

Whatever else Sir David, and the King possessed in terms of innate ability or genetic endowment, their environments shaped their eventual musical tastes, abilities and performance styles, and what they each experienced provided the stimuli and opportunity for their growth and development. A fact which makes our understanding of the role of musical enculturation up to kindergarten age of crucial importance.

Let me now focus a little on development up to Kindergarten age in order to get some idea of the extent and scope of auditory experiences stored in a young child's brain.

The Auditory World of the Fetus

The English poet Samuel Taylor Coleridge wrote in 1885 that: "The history of man for the nine months preceding his birth would, probably, be far more interesting, and contain events of greater moment, than for all the three score and ten years that follow it" (cited in Wilkin, 1991).

Contemporary science is now enabling us to study systematically the life and behaviour of the fetus. The fetus has genetic endowment, but no specific cultural content. As she grows and develops the environment shapes her unique abilities, receptor organs, and brain function. She draws from the environment all that will make her what probably she might become and achieve in language and music. An environment which is harmful or injurious, for example one where drugs or severe alcoholism provides the physical and emotional context for growth, will induce severe malfunction in the fetus. By the same token, the development of music or language is dependent on a favourable environment which nurtures these both before and after birth. But we should not underestimate the developmental effects of the sonic experiences of the fetus.

Sound travels well within the uterus since the natural impedance caused by air transmission of sound pressure waves changing to fluid transmission (the normal way sound pressure waves are transformed from the air to the cochlea fluid via the outer ear) does not occur beyond the mother's skin simply because the fetus exists in fluid. Various experimental studies indicate that the fetus learns to respond to specific sounds after about 25 weeks (Lecanuet et al., 1992), and that after birth the new born remembers the sounds they learned in the womb (Lecanuet, et al, 1991).

The ear begins to form within the first month and by the beginning of the third trimester the fetus shows clear signs of responding to sound. Prior to this, the ear is forming, having begun its development from about the 3rd week of pregnancy. At first lower frequencies, those below about middle C (261 Hz) are more able to stimulate the developing cochlea, but the reception range soon increases to include higher frequencies by the second trimester. Ultrasonographic observations of blink-startle responses to vibroacoustic stimulation are usually first elicited at 24 weeks of gestation and are consistently present after 28 weeks, indicating maturation of the auditory pathways of the central nervous system at that stage (Birnholz and Benacerraf, 1983). During the 2nd trimester, the cochlea in the fetus is well enough developed to suffer hearing loss if exposed to excessive noise (Gerhardt, 1990).

Many studies of pregnant humans shows that the fetus enjoys a rich sound environment (Querleu, D., Renard, X. and Bontteville, C., and Crepin, G, (1989).). Environmental sounds, especially those below about 250 Hz, are easily carried across the abdominal wall with very little attenuation (Gerhardt, K. J., Abrams, R. M., and Oliver C. 1990). And it should be remembered here that for most rock music extremely loud frequencies below 200 Hz are considered an essential part of the sound. After about 28 weeks there are more overt responses to medium-high pitch stimuli than to low tones (Lecanuet, J-P, Granier-Deferre, C, and Busnel, M-C, 1988). By 42 weeks, the auditory system functions nearly at adult level. So important is the acoustic environment to the developing fetus that the well-being of the fetus is judged by its responses to sound pressure waves. The test sounds employed are usually from 1 - 4 seconds in length, with frequencies of between 1220 - 15,000 Hz at 100-130 dB (Serafini, P, et al , 1984).

In an interesting longitudinal study of ante-natal and post-natal responses to music, Phyllis Wilkin (1991), of Edith Cowan University in Perth, demonstrated that the fetus's tested responded differentially to a variety of pieces of music. Dr. Wilkins' data showed that there were significant differences in fetal responses to each auditory stimulus which comprised white noise, the opening of Beethoven's Tempest Sonata, Opus 31, No. 2 in D minor, the Kyrie and opening of the Gloria from Palestrina's Missa Papae Marcelli, and an instrumental rock piece by Emmerson, Lake and Palmer. One fascinating conclusion was that the fetus responded more vigorously to piano music than to the rock music or white noise. The piano and the choral music were more or less equal in eliciting vigorous responses. Postpartum tests on the same fetuses showed that all the babies produced more movement and eyes-open responses for the piano and choral music than for the other stimuli - i.e. white noise and instrumental rock.

These data suggest that the complex patterns of music are both perceived and remembered from pre-natal to post-natal conditions. Several studies in recent years have demonstrated the possibility that responses to music may be biological (Papousek M., and Papousek H, 1981; Fassbender, C, 1993; and Trehub, S. 1987; Trainor, J.L., and Trehub, S E., 1993). And provided that the care-giver, the parent, interacts with the child early on there is evidence that the early ontogeny of musicality may be observed at least during the 2nd trimester (Fernald, A, 1992; Papousek, H and Papousek M 1984; Papousek M, 1992). Recent scientific studies involving speech sounds provide evidence to support Wilkins' data using musical sounds, and suggest that the fetus both processes sound and remembers this processing (Busnel, M-C., Granier-Deferre, C, and Lecanuet, J-P, 1992; Lecanuet, J-P, Granier-Deferre, C. Jacquet, A.Y., Capponi I and Ledru, L (1993).

Following birth, the hearing mechanism develops very rapidly to reach maximum efficiency within a few months. Indications of the sensitivity of both the fetus' and the infants' hearing capabilities are found in studies of the effects of noise on both the fetus and the newborn. These have demonstrated the dangers of hearing loss caused by sudden loud noises, such as someone closing a door, or tapping on the cover or frame of the child's bed, or shouting. Such sounds for an infant are the equivalent of gun shots or jet engines close up for an adult.

By the time the infant can begin to respond with conscious smiles and looks, usually after a few weeks, the child has already learned to associate the mother's voice with the sight, touch and smell of their mother. Between one and two years, the child can assimilate a variety of experiences in several different modalities and respond to different people in their lives. Language development starts early and by 16 months most children can utter short sentences or at least strings of imitation words. One 1994 study (Fenson et al, 1994) involving several thousand children in the USA show, that by 2 and a half years of age most children can produce sentences with up to eight- ten words, and some children up to 14 words. We have no comparable extensive data for music acquisition, but we can be sure, given the same exposure to music that most children have to language, a similar startling developmental trend would be apparent.

Studies in music acquisition show that children can develop melodic and rhythmic skills at a very young age, given sufficient exposure and interactions between infant and caregiver. However, what is of real interest to music educators is the probability that children will have had sonic experiences of both music and language in equal measure from the fetus stage onwards, but not necessarily the kind of music which is usually found in formal music education.

Hanus Papousek (1981 and 1985), and Mechthild Papousek (1992) of the University of Munich claim that the vocal tract functions very early as a potential toy for vocal play. As anyone observing the growth of an infant can testify anecdotally, this is certainly the case. The Papouseks suggests that the voice is really the first musical instrument and through frequent and imaginative interactions with caregivers, very young infants can display astonishingly complex and wide ranging vocal behaviours which we can classify as singing. These are often far more extensive than pedagogical materials which are thought to be suitable for school use would allow. For example, the Papouseks has documented vocal ranges in pre-school children extending from below Middle C to about G5 (784 Hz), suggesting an operational range of an octave and a half. Anecdotally, many parents would confirm this through their own observations of their child's vocal play. This behaviour can and should be extended and encouraged to well into school age. Unfortunately, however, too many songs thought suitable for children range over less than an octave from Middle C on the mistaken assumption that young children's voices are unable to do anything else. This would suggest that schools might actually inhibit musical growth, and some research tends to confirm this. Several researchers have observed (See Strauss, 1982) the phemonenon of u-shaped behavioural growth which appears at around the age of about 7 or 8 years as the child gets accustomed to the more controlled and limiting demands of the school curriculum. It is at this age that experimental evidence shows a decline in musicality and creative behaviour generally (ibid).

Modern Urban Life and Noise Pollution

But organised education is not the only apparent barrier to a more linear and progressive development of musical and linguistic ability. Our modern urban environment presents other problems for the growing child. The sound world of today is more complex and more varied than at any time in history. In a typical urban environment the range of sounds includes a wide variety of mechanical and electronic devices, various forms of transport from cars, trucks or lorries and buses, to airplanes. Noises around the home include lawnmowers, and various electrically driven devices for performing tasks like saws, food mixers and blenders, dish and clothes washers, or screwdrivers and drills, as well as television, record playing equipment and radios. Sounds of nature are largely submerged in the welter of sound which comprises the modern urban environment.

And given today's highly technological and market-driven world, the ubiquitous presence of music on film, television, radio, and recordings, it is the unusual young mother who does not want to have any kind of music playing while she is at home, or has no devices making noises. Since the 1950s, young people from their early teens have been seduced into listening ardently to the latest popular hits to the point of emotional saturation. Many have been exposed to extremely loud sounds at rock concerts and similar events, nurtured or brainwashed by the media to want and expect popular music to be played at sound pressure levels which can be dangerous to the health of one's hearing mechanism. Today we have terms such as noise pollution and sociocusis, the latter indicating injurious health effects from exposure to loud noise.

Noise pollution has been determined by the USA Environmental Protection Agency (1990) as sound levels which exceed 55 dB, and it is estimated that well over half the American population live in areas where this level is exceeded. The same would probably be true of most developed countries. From the same source in the USA, we find that over 70 million people live in areas where urban traffic noise exceeds 60 dB. Sensori-neural hearing loss from too much noise results in damage to the cochlea and neural structures of the ear. Sociocusis is the term indicating loss of hearing sensitivity due to noise exposure. Evidence shows that prolonged exposure to noise levels above 75 dB may cause hearing loss and other severe health defects. If we look at some relevant dB levels we can see how exposed the delicate and sensitive hearing mechanism really is, bearing in mind that the decibel scale is logarithmic which means that increasing a sound intensity by 10 raises its level by 10 dB, by a factor of 100 by 20 dB, by a factor of 1000 by 30 dB and so on.

Rustling leaves sound at about 20 dB, a quiet whisper at 3 feet sounds at about 30 dB, and a quiet home has an ambient noise level of about 40 dB (Truax, 1978). Normal speech at 2 metres distance sounds at 60 dB, and a raised voice at 66 dB. Normal speech, then, can be up to 1000 times louder than a quiet whisper at fairly close proximity. At half a metre a raised voice reaches 78 dB. Loud singing at 3 feet sounds at 75 dB and some alarm clocks reach 80 dB. Dangerous levels occur above 80 dB and include amplified rock music (at 6 feet 120 dB), chain saws (at 3 feet 117 dB), power lawnmowers (at 3 feet 107 dB), diesel trucks (at 30 feet 100 dB) and jet planes (at 100 feet 130 dB). It was estimated in 1990 that more than 20 million people in the USA are exposed to hazardous noise levels on a regular basis and typically firefighters, police, the military, construction and factory workers, farmers, truck drivers, rock musicians, some orchestral players, and audio-engineers are in high risk categories. It appears that many of the gadgets we use in our homes are also potentially dangerous as noise producers, and the fetus and the infant grow up in such a world.

An interesting observation is that few of these levels or types of environmental noise could have been experienced in the early childhood of either Elvis Presley or David Willcocks. The rise of such noise levels is a recent phenomenon dating from about the late 1950s onwards. At the time that King Elvis was listening to the family radio in the 1940s environmental noise was far less intrusive. Few people had cars, and trucks were not that common. Airplanes were even less in evidence. Domestic machines such as lawn-mowers were generally quite silent and

driven by human energy. Similarly, the sonic environment of the young David Willcocks in the 1920s and 1930s was fairly quiet and without what we now call noise. Even sporting events had little of the comparatively hysterical shouting and screaming we now accept as the norm at football, rugby or even cricket matches where Australia beats England yet again. Even at the comparatively sedate and physically remote golf tournament, one can now hear the crowds screaming as the ball drops into the tiny hole. Clearly sport has become a form of social theatre.

In some ways one could argue that the relatively quiet sound worlds of the early childhood of each of our two famous performers is reflected in their music. Willcocks' most beautiful choir sounds are often at whispering levels, and despite the criticisms Elvis's recordings attracted, his early ones particularly, sound almost sober at this point in time nearly half a century later, even Puritanical compared with some "grunge" or "heavy metal" and other cult pop music that has been produced since. A fact which raises some interesting questions about taste and value in the context of a continually changing and developing musical and sonic environment.

Other Sound Worlds and Mind-sets and Contemporary Music Education

If we consider the type of sound-world into which either Mozart or Monteverdi was born the issue becomes more urgent in terms of music education. The loudest sounds Mozart could have heard were probably those of human voices or musical instruments. Silence was a more normal auditory backcloth than noise. Transport was mostly done on foot or horse-back, and the sounds of horses hooves are not that intrusive, even close up. The noises in the street of a large city like Vienna, where Mozart lived most of his adult life, would comprise the usual conversations and street vendors shouting, as well as church bells, clocks, and horses and carriages rolling by. But these had to be sought out rather than endured. They were not intrusive, and in the home there was almost certainly a complete quiet, such as we do not often experience today. The walls of houses tended to be very thick and compact keeping out most if not all outside sound. It was in such an environment that the harpsichord, clavichord and spinet could sound quite clearly, and the violin might even sound quite raucous in comparison. In Monteverdi's case, it was much the same. His work in Venice at St. Marks, would mean the sounds of that great church were ever present, and the only difference in the sonic landscape between the Vienna of the late 18th century and the Venice of the early 17th century would be that of the waterways. It is quite likely that the loudest sounds both Mozart and Monteverdi encountered were those of the music they performed or heard.

This presents an interesting problem for music educators who might wish to teach the children of today's world about the music of Mozart or Monteverdi, or any other historical composer. As we have seen in the examples given above, environment plays a key role in the musical and linguistic development of children, and in the eventual musical styles they adopt. How do we reconcile the mind-set of today's children, considering their sonic environment, with the music of Mozart or Monteverdi, etc., given the enormous environmental differences which shaped the auditory responses and experiences of each?

It would seem that the problem lies as much in the mind and its workings as in the musical elements. A proposition which would seem to indicate that a music education focus limited only to learning about basic musical elements such as pitch and rhythm might well be counterproductive given the crucial role of enculturation in setting the minds of children on their musical pathways. Such simple musical elements alone cannot supply the crucial information which the mind seeks by virtue of its complex and sophisticated growth and development within its particular environment. Put instrumentally, it could be argued that a child reared in today's cacophonous world at its worst has little chance of getting near to the subtleties of the music of Mozart which emanated from a totally different sonic and intellectual environment.

The answer, I suggest, lies in what we might call tuning the mind to different sonic environments than today's children are used to, which in practice means teaching children how

to listen, and in providing them with opportunities to experience difference sonic environments, particularly those where silence is the predominant feature and backcloth.

Again, the problem is twofold, involving the auditory environment and the value system which supports it. At the time when King Elvis and Sir David were both growing up the seeds of our contemporary world were present. Gramophone records were available and selling in millions but only to the relatively affluent. Radio was also available to a small section of the population, and the more accessible musical world of movie theatres or cinemas were certainly in most towns. When Willcocks was a boy about to enter the choir of Westminster Abbey, the first movie with sound - "The Jazz Singer" - came out in 1927 and contained a mixture of musical styles ranging from jazz to Tchaikowsky. By the time Elvis was a boy in the 1940s movies like "Casablanca" and "Gone with the Wind" were providing emotional experiences engendered by vicarious contact with the classical music repertoire to millions across the world, and the radio and gramophone, also carrying similar messages, were then more ubiquitous across all segments of society.

Today, there is no one in almost any part of the world who has never seen a television, or heard a radio or some kind of player of recordings. In Bali, for example, where a television set costs a year's wages for most of the population, the impact of the western media is less dramatic and intrusive. Nevertheless, traditionally dressed performers in the Gamelan and dancers in the Ramayana ceremonies go back to their jeans and t-shirts once the performance is over and ride off on their mopeds listening to the latest western pop on their headsets. In western societies music is everywhere. You cannot escape it. Canned versions of Schubert's Marche Militaire or Handel's Water Music greet you as you walk down the crowded isles of an aircraft to settle down for a long journey. Elevator music of indescribable anonymity and blandness accompanies your ascent to the 25th floor of some office building where you might have to go to get your airline ticket.

The Muzak Corporation has carefully crafted the melodies, harmonies and orchestrations to such a degree that the most sensitive of musical minds would have difficulties locating the most minute elements of expressiveness in the music which greets you as you walk into a large department store or railway station. Nothing intellectual must be allowed to interfere with the sacred business of buying and selling something. There is no escaping unwanted musical intrusion even if you settle down in your favourite chair in your own home to watch a favourite movie on television. Commercial breaks will bombard you with images of luxury cars linked with those of elegantly dressed women accompanied by silky smooth arrangements of string music by Albinoni, or flashes of world locations showing some airlines' logo made up of children in coloured costumes with a suitably manicured arrangement of an operatic duet by Delibes providing a sonic backcloth. And even if one rents a movie one has to plough through the first 10 - 15 minutes of the tape showing advertisements for other movies you probably don't wish to see or know about with a non-stop rock or heavy metal musical background, and shouting voices of actors and sales-people in competition with it, telling you how great all these other movies are. And just when you think the movie you rented is about to start you are threatened with a warning that more movies will be reviewed when it has finished.

The effects of this surfeit of music across the range of entertainment media today, coupled with an unsurpassed capability for intrusion into everyone's life generated by advanced technology, are not yet clear in the collective consciousness of any culture. Very little research exists at present which has attempted to study, in any systematic manner, the cognitive strategies or neural networks formed by the daily bombardment of media music in all its forms. It has to be the case, however, that some effects are occurring since it is impossible for human minds to experience without interpreting. Neil Postman (1985) cites research in New York on disadvantaged urban children who show signs of neurological atrophy attributed to many hours daily sitting watching television and doing little else in their lives.

Connections between the type of sonic configuration of a particular musical practice and the culture-specific mindset have been observed and established experimentally. The special ways in which the Pacific North West Indian singer shapes his vocal tract have links with his

naturalistic philosophy of life in that he would normally use a more neutral vocal position than the special and unnatural ways of widening the pharynx tube opening and lowering the larynx found in modern western art music traditions (Walker, 1986). The Indian singer would concentrate most spectral energy around the first natural formant peak (around 600 Hz) whereas the more unnatural vocal posture of the western singer would induce an unnatural energy peak at around 2800 Hz known as the singer's formant (Sundberg, 1987).

A detailed study of relationships between a variety of singers from different cultures demonstrated empirically that there is a clear connection between cultural ways of thinking about music and the sonic characteristics of the singer's voices (Walker, 1992). For example, singers from the Tuva region of eastern Russia induce high levels of spectral energy between about 1500 Hz and 2000 Hz giving the impression that they are producing two different pitches from one vocal tract simultaneously. This is a very different cultural practice from that of Western Opera singers. Moreover, this type of sound works well in their mountainous environment, just as the western singer's formant is an essential attribute enabling singer to be heard in opera houses above the sounds of the orchestra. Japanese traditional singers raise their larynx, as opposed to the lowered laryng of the western style, a practice which is an integral part of the Japanese way of thinking about sound. In turn, each produces a different spectral energy profile (Imada, 1997).

In studies of mental imagery of music and sound, considerable and statistically significant differences in the type of imagery have been observed between different cultural groups (Walker, 1987). For example, remote First Nations people of Canada displayed a marked difference in interpreting pitched sound from urban westernised subjects. This would reflect the western focus on pitch and melody, as opposed to the more eclectic use of other sound parameters by many First Nations people of North America. A further study (Walker, 1997) of notational use and mental imagery in a variety of cultural situations demonstrated that some western observers of the music of other cultures misinterpret such music by virtue of their understandable use of the western mind-set in regarding pitch as the paramount musical parameter, while ignoring the crucial importance of other sonic parameters. Western attempts at notating the music of other cultures suffers particularly from this type of cultural mind-set. The same study demonstrated further evidence of statistically significant differences between formant configurations across different cultures which showed clear relationships with cultural ways of thinking about music and the sounds produced within a cultural context. The argument for an educational focus on musical beliefs as the crucial link between musical sounds, a culture's belief system, and the musical system within which musicians operate and by which they are motivated is compelling in view of the evidence outlined above (Walker, 1990, Walker, 1998).

Training the Mind: The Importance of Silence

Musical sound is now cheap and ubiquitous and easily merges into the lively auditory environment along with traffic noise of all types, two-stroke or even 4-stroke lawn mower engines, pedestrians who like to share their musical tastes with the world by encasing themselves in a cocoon of sound from small but deadly loud speakers. Technology has now produced speakers so small they can fit on a tie pin as well as fit snugly into the ear, and they deliver a complete frequency range at high sound pressure levels. Cars are fitted out with deafening sound systems so that you don't hear the engines revving or brakes squealing, just the thunderous banging of the bass rhythms and the squealing of the driver and passengers as they float by in a sonic cloud.

Add all this music to the increased liveliness and variety of the general sonic backcloth we all experience, and today's urban environment becomes a place where such auditory plenitude inevitably breeds levels of passivity and acceptance bordering on indifference to most sounds including those of music. What value can the magnificently crafted orchestral climax in Ravel's Daphnis and Chloe orchestral music have to someone who can go from 2 dB to 140 dB in 2 seconds flat on their amplified electric guitar? And what price the subtle and delicate harmonies

of a Schubert song when you can hear the derivative close harmonies of the Spice Girls and watch them cavort around the stage?

One is certainly tempted to invoke the warnings of Oswald Spengler in his book of 1920 "The Decline of the West", or F. R. Leavis in his 1930 book "Mass Civilization and Minority Culture". They, and others of the time, like H. G Wells in his book "The Shape of Things to Come", and Aldous Huxley in "Brave New World", warned that mass production and mass consumerism would in the end destroy the culture of Europe. Their solution was that European high culture was only for an elite, and could not be spread to the masses of the population and remain in its refined state. And while their warnings about the effects of cheap mass production and market driven consumerism might prove to have been well founded, we as music educators cannot accept the proposal that art music is only for an educated elite. By our very nature, we believe that all are educable and it is our function to educate every child.

One important reality for music educators today is that we need to tackle the problems of the mass consumer society we live in, and we need to tackle them on two levels: one, the effects on our auditory sensitivity of noise levels and the ubiquity of musical fragments in so many different locations in our urban environment; and two, value systems, or lack of them, engendered by this auditory plenitude. Both these levels involve effects on the mind and its thought processes which in turn suggest that we as music educators should aim at far more than an acquisition of what we might consider to be basic musical skills which involve little than learning simple elements of pitch or rhythm. Our focus should be on training the mind, a training into culture- specific ways of thinking about and discriminating sound.

How might this work? Clearly, in many of today's schools music teachers fight impossible odds with problems of sound control caused by inadequate or unsuitable working conditions. Music lessons held in dining rooms or assembly halls surrounded by hard surfaces provide quite the worst type of location. Any sound quickly becomes reverberating noise in such a physical environment. We need classrooms which are quiet inside and have no noise levels coming from without. Classrooms where we can teach our children about silence. Where musical art can be heard and practised in a background of silence. A training of the ears and mind in listening in such circumstances should be a significant part of any music pedagogy. Only from a background of silence can we hope to start to change the minds of children in their thinking about music, and their sense of appreciation of the art of music in any culture. Only from a background of silence might the subtleties of musical art be properly learned and fully appreciated.

The back-cloth of silence for musical performance and reception is certainly not peculiar to the music of the West. The Korean Shinawi, or Japanese Noh, or Balinese gamelan, or an Aboriginal spirit dance, etc., etc., all require the complete auditory stage to themselves with no competing sounds. It is the concept of no competing sounds which is likely to prove most difficult in today's music education precisely because the children who come to our schools have little experience of such a listening situation. Their auditory world comprises cacophony: a conglomeration of competing sounds where the loudest is certain to grab most attention. This is the central problem of music education today and the need to reshape our music pedagogies so as to develop listening habits in children which require no competition from auditory sources extraneous to that of the music being studied is paramount. In my view this represents one of the most challenging obstacles music educators face in today's world.

Interestingly, support for a music education which focuses on silence as a back-cloth can be gained from the way in which music has been received and appreciated in western culture over the last few centuries. From its earlier embedding in church ritual and associated secular festivals and other community events supported by the Church, after the Reformation musical performance began to move to the secular sites of the opera house, the private rooms of the rich, and eventually to the public concert hall. During this time, the art of listening gradually became accepted and refined to the point where we now actually listen in silence to the music being played at concerts. Historically, in western culture, audiences did not listen intently to music. George Bernard Shaw (1932) testified to the noise audiences produced during

performance in late 19th century London, and earlier there are many stories of performing musicians finding ways to embarrass talkative patrons, despite their noble birth-right.

Almost perversely, the range of music we can experience now reflects a growing interest in music that has become more diverse and sophisticated during this century, demanding that we listen carefully to the enormous range and variety of music made available to us through the various entertainment media or through increased facilities for travel. Yet at the same time, the environment has become so noise-polluted that it is increasingly difficult to hear anything without interference. In educational evolutionary terms music educators need to provide pedagogies more appropriate for today's environment, and less connected which environments which no longer exist. The importance of links between the environment and music pedagogy is something we music educators have not paid much attention to in our desire for an historically rooted basic but limited literacy and skill development which has dominated music education pedagogy ever since its modern introduction at the beginning of the Industrial Revolution (see Rainbow, 1968).

I suggest that the noise polluted world we live in now makes it imperative that we consider radical change to our music education pedagogies so that we develop the minds of our young people to learn and appreciate the special sounds of each musical culture. To achieve something like the pristine state of hearing that societies such as that of the Ituri Pygmies (Turnbull, 1962) of central Africa, who had been relatively untouched by any other culture from the outside world for thousands of years up to the 1950s, would be impossible. We cannot eradicate experience, and we cannot replicate the effects of an environment such as that of the Ituri Pygmies whose sound world for so long comprised little more than forest sounds and those of their own music, dance and speech. But the purpose, as well as the challenge, of contemporary music education is to educate minds, and in this case we are talking about minds which have probably been polluted as far as the art of music is concerned. One purpose of music education should be to tackle this noise-pollution.

The kind of educational environment I refer to is an auditory environment for musical sounds which sets them off like jewels in a show case. Music is always bound to lose out when its sounds are in competition with the cacophony which makes up our contemporary urban environment. Moreover, given no action by music educators, one might speculate that at some point in the next century our populace will not be able to tell the difference between a Mozart Symphony, a Balinese gamelan, and the background music to the latest episode of the "Bold and the Beautiful". At that point western culture, assuming the term means anything to do with historical traditions, along with most other cultures, will surely be extinct, submerged by mass commercialism and the vagaries of polling and popular demand. And the doom and gloom of Oswald Spengler, H. G. Wells and F. R. Leavis, in the early years of this century, will be seen to have been justified.

But to end on a more positive note. The provision of a suitable auditory environment for music education is not enough. The purpose of music education should be to educate the mind in the value systems which nourish and support the sound world of a particular musical culture. Musical sounds without an accompanying value system are no different from environmental noise. The purpose of a music education should be to teach value systems in sound, and how sounds can act as powerful metaphors and tropes for cultural ways of thinking and living. Learning how to appreciate the various subtle ways in which different human societies have developed their own special ways of symbolising the central values and beliefs of their culture in music should be the aim and purpose of music education. Understanding music means understanding a particular way of thinking in sound, and intelligent listening to music means being able to make the essential links between musical logic systems, musical behaviours, and the special cultural environment in which these have grown and thrived.

Learning how to cope with and understand the auditory environment into which we are born must have the complementary information which delineates the value system music stands for. Music must be taught as a metaphor for cultural ways of thinking and behaving, not just auditory wallpaper for filling in empty sonic space.

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Keynote Address

Children and Music: A Sociological Perspective on Development

Graham F. Welch

Introduction

The manifestation of musical behaviour at any given age, including childhood, is located at an interface between *three generative elements*, namely (i) the overall nature and individual developmental history of our human anatomy/physiology, (ii) socio-cultural[1] context, and (iii) music (however defined) (Welch, 1998[a], 1998[b] - see figure 1).

Firstly, the mind's basic design is such that we are able to make sense of our sonic world through the utilisation of a hierarchical signal processing capability that appears to progress from the perception of *psycho-acoustic features* (such as pitch, loudness, duration, timbre), to *structures* (detecting/constructing patterns and regularities in the sounds), and (subsequently) to music's *syntactic and communicative elements* (being the potential for musical sounds to be characterised by a grammatical function within the musical context: music as a form of language) (*cf* Spender, 1987; Welch, 1998[a]).

Secondly, and at the same time, the functioning of this basic cognitive architecture is shaped temporally by socio-cultural factors. These include social and pedagogical structures and processes within the home, school and community and a cluster of associated values, norms, roles, and identities that facilitate socio-cultural reproduction and transformation. Through their socialisation into the dominant culture(s), children are exposed to many different sounds and musical genres.

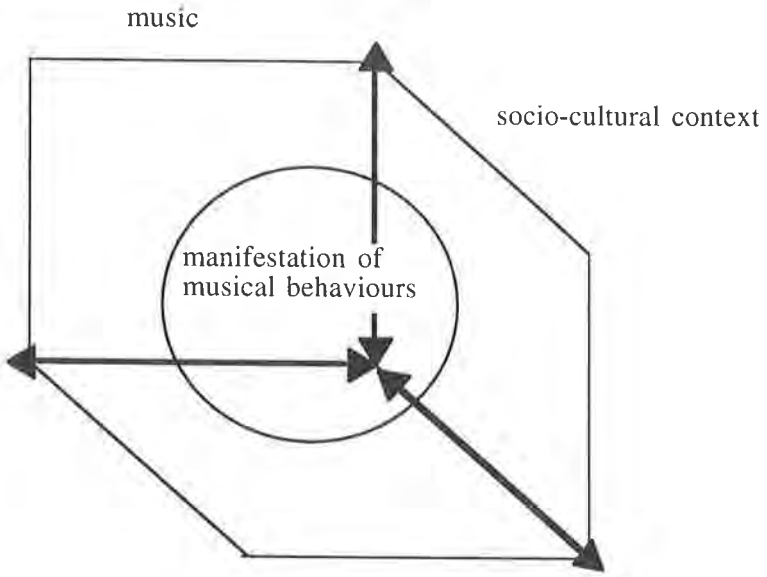
Thirdly, and concomitantly, such socialisation determines which particular groupings of perceived sounds are to be classified and valued as 'music' within the culture, being something learned and not absolute (Finnegan, 1989; Burns, 1999; Carterette & Kendall, 1999). Certain groups of sounds are attributed semiotic meaning and status within a particular culture. Sounds that are processed by one mind as belonging to a particular musical genre (with the genre's concomitant set of 'rules') could equally be perceived by a more perceptually 'naive'[2] listener at a basic psycho-acoustical level in which musical form appears to be lacking.

Unpacking the nature of this individual/socio-musical interface is central in our understanding of children's musical behaviour and development. The current empirical evidence is unequivocal that all humans have the potential to exhibit musical behaviours and to be 'musical' (*cf* Gardner, 1983; Sloboda, 1985; Lecanuet, 1996, 1998; Papousek, 1996; Hargreaves, 1996; Trehub, Schellenberg & Hill, 1997; Welch, 1998[a], 1998[b]). Being 'unmusical' is only tenable as a concept in relation to behaviours that are assessed against the rule system inherent within a particular musical genre. The notion that anyone is 'unmusical' in any absolute sense runs contrary to the findings of the many research studies that have examined the benefits of supportive pedagogical strategies and environments on musical development (*e.g.* Hallam, 1998; OfSTED, 1998; Folkestad, 1998; Durrant, 1998; Cottrell, 1998; Harwood, 1998; Webster, 1998).

Three recently published examples are offered as illustrations of the individual/socio-musical generative interface (*pace* fig 1) 'in action': (i) some contemporary pieces of Indian choral music use native musical elements (such as ragas) and vocal production that are often antithetical to the compositional and acoustic mores of Western choral music (de Quadros, 1998), (ii) children as young as four years can intentionally portray happiness and sadness contrastively in their song performances of a familiar song, borrowing expressive devices used in interpersonal communication from the dominant culture

(Adachi & Trehub, 1998) and (iii) a neuropsychobiological study has indicated that skilled adult musicians have (on average) 25% more of the auditory cortex given over to musical processing than adult representatives of the non-performing population (Pentev *et al*, 1998; see also Carter, 1998 and Schlaug *et al*, 1995). Each is a product of the relative combination of the three dimensions.

Figure 1: The multi-dimensional generative interface for the manifestation of musical behaviours



Given the possible range and depth of interaction between the model's three generative elements, it is not surprising that, at the level of the individual, similarities and differences are evident in the development of musical behaviour. Such similarities and differences are the outcome of the inherent tensions between (a) the musical 'pathways' (Finnegan, 1989) that groups and societies utilise to induct, foster, perpetuate (and transform) musical traditions across successive generations and (b) the somewhat more idiosyncratic developmental 'routes' (Welch, 1998[a]) actually taken by individuals as they encounter and attempt to make sense of the dominant musical genres within their particular sonic environments.

This paper focuses on the extent to which these individual 'routes' and societal 'pathways' are reflected in the reproduction and transformation of concepts of musical behaviour within our Western society and how such 'routes' and 'pathways' impact on individual musical development, both positively and negatively[3]. Key illustrative examples are taken from recent and current research studies by the author and colleagues in the UK, including: the introduction of girls to traditionally all-male Cathedral choirs (Sergeant & Welch, 1997; Kerslake, 1998), the nature of contemporary South Asian music in Britain (Farrell, *et al.*1998) and longitudinal studies of children's singing development in both early childhood (Welch, 1997) and adolescence (Cooksey & Welch, 1998).

Socio-cultural reproduction and transformation: opportunity and the development of musical ability

'The idea of having girls was quite a radical revolution; it hadn't happened at all in the English Cathedral tradition up until now. It was suggested to us in the first instance by an inspector of schools who came when the school was inspected. . . . . Here we have a

specialist music school and we have the cathedral and its choir. The inspector at that time...said, 'Why don't you start the idea of having girl choristers?. . . You have boys and girls in the ordinary school and in the music school. Why don't you start having girls as choristers?' That was an idea that was a bit of a novelty and a bit startling, I think, to the then organist. . . .' [Kerslake, 1998: 53 - interview with the Cathedral Precentor at Wells]

The numbers of cathedral girls' choirs has gradually increased since their inception at Salisbury Cathedral in 1991. By 1997, out of a total of thirty-nine cathedrals, minsters and major chapels belonging to the Choir Schools Association, four cathedrals had established parallel boys' and girls' choirs and seven others were planning to do so in the near future (Choir Schools Today (1997: 19)[4]. However, with one exception (in Scotland), the boys' and girls' choirs did not perform the daily services together. Rather, boys and girls either sang on alternate days, or the boys were still undertaking the majority of the sung worship.

The reasons for this differentiation appear to be complex, with cathedral choir directors emphasising the time needed to establish a girls' choir that has same skill levels as that traditionally expected from boys.

> 'In the boys' choir we only add two or three per year who, by osmosis, pick up the repertoire. The girls' choir was started artificially, older and younger all at once. Initially, they did a lot of practice and not many services which was a problem for motivation.... Every time music was prepared for the service [the Psalms], it took a great deal of work; whereas, the boys have spent five years on psalms.' [Kerslake, *op,cit.*:44 - interview with the Director of the Cathedral Choir, Wells]

There was (and, in some cases, is) also a concern that the particular 'traditional' vocal timbre associated with boy choristers would be modified negatively by the inclusion of girls in the same choir. The need to preserve this 'unique' timbre has generated much debate and has been a central feature of a controversy surrounding this 'radical' notion of introducing females into an all-male choral music tradition that stretches back over fifteen hundred years[5].

> 'A boy's voice in the year or so before it breaks [sic] has a particularly magical quality. It is more powerful than a girl's'.' [Hodges, 1995: 15 - interview with the organist at Canterbury Cathedral]

Some detractors of the female access policy have been so concerned that they formed the 'Campaign for the Defence of the Traditional Cathedral Choir' (CDTCC; Rainbow *et al*, 1997).

> 'Our cathedral choirs of men and boys are a stupendous inheritance.... It would be a cultural and spiritual tragedy of incalculable proportions were we to lose them. And within these choirs, it is the evanescent beauty of the boy's voice, a crystalline cry to the world outside and beyond us, which is able to touch our minds and hearts as perhaps nothing else. ...Already, some 24% of major cathedrals have a girls' choir...this is a development which threatens the all-male tradition.... A boy's voice is platonic. That doesn't mean it's neuter, because it's above and beyond gender in the same way that Ariel's is..... there is a natural affinity between the pre-pubertal boy's voice and church music.' [Rainbow *et al*, 1997: CDTCC website]

Notwithstanding any egalitarian and anti-sexist pressures from a wider society to effect change in this all-male tradition, others have echoed these traditionalist concerns (Haunch, 1998; Kay, 1998), in part because of the strong cultural association of the cathedral musical repertoire with an image of boys choristers, linked to the aforementioned perception that boys have a 'unique' vocal timbre when they sing.

However, as with other forms of musical behaviour, the male chorister timbre can be seen as a product of the interface between the three generative elements in the model (fig 1). For example, analyses of boys' basic vocal morphology compared with those for girls reveal very small systematic differences in childhood up to the age of puberty (Titze, 1994; Stathopoulos & Sapienza, 1997; Thurman & Klitzke, 1993; White, 1998), in part reflecting the generally larger body weight and height of boys compared to girls and also the slightly different growth rates in the length of the membranous portion of the vocal folds (the part that vibrates to generate the sound waves that are amplified and dampened by the supraglottal vocal tract[6]). Yet the effect on function of these slight physical differences is equivocal because there are close similarities in phonation between boys and girls in their vocal pitch ranges and SFF (speaking fundamental frequency) in speech between the ages of three and ten years (Titze, 1994). With regard to singing, untrained girls tend (as a group) to exhibit slightly larger pitch ranges (in the upper pitch region) than boys, yet this is highly specific to task and skill level (Welch, 1979a; Wurgler, 1990; Welch, 1997), whereas trained girls and boys exhibit identical performing vocal pitch ranges (as evidenced by commercial recordings).

Given such evidence, any perceived sex differences and gender labelling of speech and singing could be more likely to be a product of the impact of enculturation and gender socialisation rather than differences in basic anatomy and physiology *per se*. Such a hypothesis is supported by the available research evidence from two recent studies. Research into the perceived sex/gender of 320 pre-pubertal child singers aged four to eleven years who had received no formal training in singing revealed a clear linear trend with regard to age (Sergeant *et al*, unpublished ms). The older the child singer, the greater the likelihood of perceived gender identification matching actual sex, but the singing of younger boys was often mistaken and mislabelled as 'girls'.

A follow-up perceptual study focused on the trained child voice, drawing on participants from fifteen choirs, including cathedral choirs from around the country and girls choirs of an equivalent musical standard (as assessed by their recorded output and national standing) (Sergeant & Welch, 1997). Digital recordings were made of each choir (and selected individuals) singing the first verse of 'This is the Truth sent from above' (in the version as collected by R Vaughan Williams). The recordings were then edited onto a single tape and randomised so that each example appeared three times. A panel of ten expert judges (including cathedral choir directors) were asked to listen individually to the edited tape and (not knowing there were only fifteen choirs) to say whether each example was either a boys', girls' or mixed voice choir. A second group of listeners, all experienced musicians, but not choral specialists, acted as a representative sample of a musically-informed concert audience.

Results indicated that both sets of listeners were very consistent in their judgements and tended to assign the choir to the same category on successive hearings. However, neither set of listeners was able to identify the correct sex of the choristers above chance level. None of the three individual choir categories (boys, girls, mixed) was reliably identified. Yet there was also a wide variation in the accuracy of judgements related to specific choirs, ranging from almost always correct to almost always incorrect. Of the boys' cathedral choirs, one was virtually always identified correctly, yet two others were often mislabelled as 'female'. Similarly, although three girls choirs tended to be identified correctly, two others were nearly always identified as 'male', So, although the sex of *untrained* older child singers can usually be reliably identified (Sergeant *et al*, unpublished ms), this is not necessarily the case with *highly trained* voices. In reality, therefore, the 'unique' stereotypical vocal timbre of the male cathedral chorister can be seen to embrace a range of timbres which may or may not conform to an individual listener's categorical sung voice gender stereotype. The actual trained chorister timbre is an artifact of the model's three generative elements (music, socio-cultural context and basic human voice design) and, as such, is characterised by a relatively wide within-group variation.

Taken together, the various research studies of the cathedral chorister indicate that a socio-cultural 'stereotype' of the male cathedral chorister singing voice is perpetuated across successive generations by the dominant socio-musical culture within the cathedral tradition (*cf* Shepherd, 1987; Kerslake, 1998). A key framing element of this culture is the physical building because the characteristic acoustic environment of (Anglican) cathedrals favours certain types of acoustic output over others and so increases the likelihood for certain musics to be performed rather than others (*cf* Walker, 1986). The socio-cultural male chorister voice 'stereotype' is reified and exemplified in text, acoustic media, socio-musical values and practice and this reification is reinforced by a psychological correlate through which such sounds are perceived as 'matching/mismatching' an internalised schematic (cognitive) model[7] of male chorister timbre. Because of their origin, these socio-cultural and perceptual acoustic 'stereotypes' have a strong male gender association. The acoustic stereotypes are related to, but not the same as, the actual acoustic output from trained male cathedral choristers (Sergeant & Welch, 1997). Significantly (in relation to the proponents of the acoustics of the all-male cathedral choir), there is clear evidence that girls can be educated and socialised to produce a vocal timbre that is perceived as stereotypically 'male'.

Aside from the more overtly acoustic (musical) considerations, the introduction of girl choristers into cathedral choirs has also brought with it a conscious review of the dominant culture. Given the controversy that has surrounded this innovation, it is not surprising that senior clerics and choir directors have professed sensitivity to the musical traditions of the cathedrals. Accordingly, a prime task has been to induct the girls into a particular socio-musical context with its associated repertoire, performance style and ritual.

> 'The repertoire is the essentially the same for both boys and girls choirs, but the girls needed a lot of work on their upper register to get the same sound [as the boys], It also required a lot of work to get the girls to sing out in the same way as the boys, they don't take the same risks, but they produce a very good legato....I didn't set out to make the girls sound like the boys, it wasn't intended, but [was] the effect of a similar expectation.' [Malcolm Archer, Director of the Cathedral Choir, Wells - personal interview with the author, 30 April 1998]

> 'New choristers are put straight into the choir stalls next to an experienced chorister. They don't sing everything right away. The probationers start learning from the older boys and girls by copying.' [Kerslake, 1998: 49 - interview with the Director of the Cathedral Choir, Wells]

> 'If you are not careful. the girls can start to make a very hard sound. This is to do with the fact that they are going into puberty and their voices are changing slightly. You have to work quite hard to get that ring sometimes on the top notes. The boys and girls are taught exactly the same vowel shapes [at their separate practices], so when you have them together there is no problem with the vowels being discoloured because they sing them all in the same way.' [Kerslake, 1998: 55 - interview with the Organ Scholar, Wells]

Yet there is also a recognition that the introduction of girls will effect some cultural changes and adaption by the principal groups of participants involved, often for the good. For example, the advent of a girls' choir at Wells has permitted the boy choristers to sing fewer services but to maintain the same amount of practice. According to the Director of Music, this has led to an improvement in the overall technique and quality of performance (Archer, personal interview *op.cit.*). Additionally, the older girls in their final year as choristers (aged fourteen plus) are perceived as producing a more 'womanly' timbre (probably because of maturational changes in anatomy and physiology) and this perception has lead to the addition of particular pieces in the cathedral repertoire that can exploit this particular timbre. So there is a sense in which girl choristers are recognised as being able to be the same as their male counterparts yet also different.

'We decided we'd try to keep the two traditions quite separate. I think its nicer to keep the boys' and girls' choirs separate and they then keep their own characteristics. My feeling is that it would be a shame to mix them.' [Kerslake, 1998: 46 - interview with the Director of the Cathedral Choir, Wells]

'At the age of eleven, there is very little to choose between the sound [of boys and girls], but at age thirteen there is a real difference between the two....boys's registers can be more marked, for example in the change around d^5/e^{b5} but not in the girls....as a composer one thinks about the possible strengths, for example girls being more lyrical and boys more rhythmic.' [Malcolm Archer, Director of the Cathedral Choir, Wells - personal interview with the author, 30 April 1998]

'Boys' voices are more flutey; they are lighter. Girls' voices are like an oboe.' [Kerslake, 1998: 57 - interview with a Vicar Principle, Wells]

The multi-dimensional nature of the model (fig 1) indicates that such perceived differences are both a 'cultural construct' (and so gender-based) and a 'biological reality' (and thus sex-based). Logically, the model suggests that any such (perceived) differences are open to alternative perceptions (depending on the listener's musical background, experience and history) whilst being (i) 'plastic', in that vocal timbre is open to alteration through training, education and acculturation, yet also constrained by (ii) the physical realities inherent in human voice design and change across the lifespan.

Despite the intended effect of creating greater equal opportunity of access to the cathedrals' 'male-focused' musical culture, the introduction of girl choristers has also been a catalyst for change that was less predictable. Whilst it seems possible to shape cathedral girl choristers' vocal timbre to 'fit' a desired acoustic stereotype and to effect cultural reproduction, there is also evidence that girl choristers are establishing their own socio-cultural tradition that both embraces and extends this particular musical genre (for example, through the addition of new compositions that are gender-sensitive).

Opportunities for children's musical development afforded by socio-cultural reproduction and transformation are also evident in data from recent research into the musics of South Asia within the UK (Farrell *et al*, 1998). South Asian communities have existed in Britain since the eighteenth century, but the main migration of people from the Indian sub-continent took place in the period immediately following second World War, with major settlements in large conurbations in the South East and Midlands, Yorkshire, Humberside and the North West (Farrell, 1997). The research data are in the form of analyses of demography, religions, languages and regional composition, complimented by interviews with musicians and audio and video recordings of musical activities within the local communities.

It is evident that children's musical development is fostered within a large and complex network of community teaching and learning that is both formal and informal. Music is taught and learned in temples and *gurudwaras*, through community organisations, in the home, in garage *bhangra* bands, in private schools of music and in an eclectic variety of state schools. UK South Asian society provides for music to be a pastime, an essential adjunct to religious worship, a form of sub-cultural identity, a vehicle for education and also an industry (Farrell *et al*, 1998). Additionally, certain musical genres appear to be linked to particular communities and languages (such as *bhangra* and Punjabi). In recent years, South Asian music has also been targeted at other ethnic groups. In Glasgow, for example, the majority of children learning *tabla* in schools are not of South Asian descent.

'In my school there were mainly West Indian and Irish students. There weren't any Indian students. When I used to [celebrate] *Diwali* with children, I used tape music and taught them songs. When they wrote poems, they used to sing them and play percussion and I played harmonium. I remember when I played opera music, I played *chitrangada*. Children asked, 'What is this?' I explained to them that it is a

> story, just like Western opera music. I used to explain to them how it was done in India. I asked children to listen to the tape and if they could identify any instrument. Very often they picked up Indian bells, drums (*tabla*)... In some *Tagore* songs there is some Western or Irish tune and they used to recognise them....Children used to bring tapes of *bhangra*. They said to me, 'Listen to this music. It is just like your music.' [Bhowmick, J. (1998). Interview with MD, well-known Bengali singer and recently retired London Primary school headteacher)

Often, the younger, second or third generation South Asian musicians expressed a view that they were musical innovators, being aware of tradition but not bound by it.

> '*Bhangra* was a male dance and not really a style of music and men used to do that and the women's equivalent was *girddha*. But nowadays *bhangra* refers to dance and music, just like ballet. *Bhangra* has changed its definition.... The youngsters are listening to top of the pops in the mainstream chart and they are also listening to *bhangra* and Hindi film songs when they come home with their parents. So they got a natural fusion of that and also the *bhangra* rhythm does fit very perfectly with the *raga*, rap and rage sound.' [Bhowmick, J. (1998). Interview with KB, record producer and musician)

Thus, the effects of cultural diversity, socialisation and socio-cultural migration combine with a globalisation of the music media to generate new societal 'pathways' by which individual musical development can be supported. As with the cathedral choir tradition, the socio-cultural introduction, reproduction and transformation of South Asian musics in Britain each provide opportunities through which children's musical development can be fostered.

Socio-cultural reproduction and transformation: The promotion of musical inability leading to disability

Notwithstanding the proposition that everyone is 'musical', the multi-dimensional elements of the model (i.e. the socio-cultural context, other facets of our human design and music's form) can also combine to create 'obstacles' to musical development, leading to perceptions of 'inability' and 'disability'. Alongside the societal 'pathways' that support the continuation of music practices between and across generations and between experts and novitiates (Finnegan, 1989), there are also features of our socio-cultural and socio-musical worlds that, when interfaced with our neuropsychobiology, are unintentionally disruptive to ideal/optimal patterns of musical development.

With regard to the individual, all sensory motor experiences are processed through a vast array of stablised yet plastic neural networks that are highly concentrated in the brain and also extend throughout the body (Thurman, 1997: 24 *et seq*). In essence,

> 'These networks are activated when electro-chemical impulses travel through the constituent neurons. Various transmitter molecules influence specific routings of the network. The glands (thyroid, for example) and tissue organs (muscles and the vocal folds, for example) of the entire body are innervated by associated neural networks. All glands (endocrine system) and some organs and systems of the body (intestinal tract and immune system, for instance) also produce recipes of transmitter molecules, and all glands and organs have molecule-specific receptors for these. Each gland's and each organ's contribution to bodily ecology is activated or deactivated when varying recipes of transmitter molecules are delivered to receptor sites by innervation or by the circulatory system. Neuropeptides are a prominent class of transmitter molecules whose function is to moderate bodywide neural, glandular and organ processing. The summated interaction of these neural, endocrine and immune system networks produce neuropsychobiological phenomena such as as perceptions, cognitions, memories, feelings, emotions, behaviour and immunity[8].' [Thurman, 1999: personal communication)

> 'When a receptor is flooded with a ligand[9], it changes the cell membrane in such a way that the probability of an electrical impulse travelling across the membrane where the receptor resides is facilitated or inhibited, thereafter affecting the choice of neuronal circuitry that will be used. These recent discoveries are important for appreciating how memories are stored not only in the brain, but in the psychosomatic network extending into the body....the fact that memory is encoded or stored at the receptor level means that memory processes are emotion-driven and unconscious.' [Pert, 1997: 143).

The links between feelings, emotion, experience and memory are important facets in the pattern of individual musical development. Experiences of music that are perceived as negative by the individual (because of physical or mental discomfort, such as a sense of being under threat, of 'failure', of inadequacy) have a neuropsychobiological basis such that any similar experience (or a memory of the experience) will trigger a similar neurophysical response (Brothers, 1997: 60). A negative circle can be created, leading to avoidance or counter-threat behaviours (Thurman & Welch, 1997: 16 *et seq*). For example, recent research by the author into children's views on singing suggests that social context is a highly significant factor in their enjoyment and motivation to sing. A marked contrast is evident between 'social' singing (singing in front of a group in a formal situation such as in class) and 'personal' singing (singing for oneself, with no other audience, or singing in an informal situation where there the main focus in not on singing *per se*, such as when playing games with song accompaniment in the playground, street and home). The following comments from individual interviews with a class of ten-year-olds in a London inner-city school appear typical:

> 'I don't like doing it [singing] in front of other people.'
> 'I don't mind singing, but I sometimes feel embarrassed.'
> 'When I'm singing on my own, I don't think about it.'
> 'I like singing with no-one else around.'
> 'Sometimes I don't have confidence in myself because if you are singing in a big group and you sing out-of-tune they laugh at you, then you feel shy. I really enjoy singing in the bath and in the bedroom by myself'.'

Such adverse feelings about 'social' singing can become compounded during adolescence. Recent research indicates that the onset of puberty and concomitant voice change is a negative experience for one in five or one in six males (Killian, 1997). This study provides evidence of strong feelings of physical and psychological discomfort and a preponderance of associated negative vocabulary (hard, difficult, no fun, problem, insecure, frustration, embarrassing, make fun). Similarly, adolescent girls have also reported negatively on the effects of both pre- and post-menarchial voice change on their singing competence (Williams *et al*, 1996).

There can also be musical reasons why some children perceive singing in school as negative compared with singing at home. The latter location provides opportunities for greater personal choice of sung music, being related to the perceived distinctiveness of musical genres and their role in the creation of social and personal identity (Russell, 1997; Zillmann & Gan, 1997).

> 'I like pop singing. I don't like jazz; not my kind of music. I like Aaron Carter's 'I'm going to miss you for ever'. I can't believe he's only ten years old. He's got an older brother who sings with the Back Street Boys. I don't like school songs really. Mum thinks I have a good voice, my brother sometimes records it.... I'd be embarrassed to sing Aaron Carter's song in front of this lot [pointing to the rest of the class at the other end of the room, away from the interview]. I sing in the shower - sometimes the neighbours complain 'coz I'm very loud. I just get hooked. I just want to sing, mostly pop [mentions Steps, Usher, Carter, Back Street Boys].' (MF, aged 10: interview with the author)

At a more macro-societal level, the stigmatisation of certain singing behaviours has a long (and inequitable) history, with literature references going back at least to the Ancient Greeks (Barker, 1984).

> 'I can't sing. As a singist I am not a success. I am saddest when I sing. So are those who hear me. They are sadder even than I am.' ('Artemus Ward's Lecture', Oxford Dictionary of Quotations, 1953:560)

> 'And an ill singer, my lord... An he had been a dog that should have howled thus, they would have hanged him..' (Shakespeare's 'Much Ado About Nothing', Act II, Scene III: comment by Benedick on hearing Balthazar sing ' Sigh no more, ladies')

The twentieth century has seen a wide variety of linguistic symbols used to denote a perceived lack of singing ability (such as tone-deaf, tone-dumb, tone-idiot (*Onchi*), tune-deaf, growler, grunter, monotone, poor pitch singer, uncertain singer; *cf* Welch, 1979b; Welch & Murao, 1994). Such nomenclature is primarily based on a *deficit* perspective of musical behaviour and focuses on what the child (or adult) 'cannot do' in comparison to some socio-musical 'ideal'. Moreover, because not all children enter the school system with an ability to sing simple songs 'in-tune' (Welch, 1997; and noting that 'in-tuneness' itself is a socio-musical construct, Walker, 1994; Burns, 1999; Carterette & Kendall, 1999), a bipartite ('can/cannot') conception of children's musical abilities is often evidenced in the early research literature (*cf* Bentley, 1968) and in studies of adult singing (Mawhinney, 1987; Killian, 1997).

Anecdotal and research evidence (Killian, *op,cit.*) suggests that such labels have been used as an excuse for poor or inadequate teaching for many generations of school children. Furthermore, inappropriate pedagogical behaviour by individual music teachers in relation to adolescent singing and voice change can be legitimated and magnified by (i) statutory instruments that mismatch national curricula for music with the physical realities of voice change (such as in England - Cooksey & Welch, 1998), (ii) socio-linguistic symbolisation of adolescent voice change in the terminology of deficit, such as categorising adolescent voices as 'broken' or 'cracked' (Killian, *op.cit.*; Cooksey, 1997) and (iii) pupils favouring musics and musical behaviours that are regarded as deviant in relation to school (Western) art music and the institution's dominant musical values (Chinn, 1997).

In contrast to earlier studies, a range of recent researches has provided a more positive insight into the nature of singing behaviours in childhood (e.g. Fox, 1982; Rutkowski, 1990; 1996; Davidson *et al*, 1981; Davidson 1994; Papousek, 1996; Welch, 1986; 1997; Dowling, 1984; 1999). The collective thrust of these and similar studies has been to celebrate the diversity to be found within children's singing and to recognise that singing behaviours are subject to developmental processes.

Development can be fostered or hindered by social context (Davidson *et al*, 1997), particularly in relation to singing in schools where musical tasks are usually formalised. An individual's neuropsychobiological encoding of musical socialisation is biased developmentally such that certain features of the dominant musical culture can have greater perceptual significance. For some children, this means that they arrive at school already 'pre-programmed' to attend to, and make sense of, both a song's musical and language features. Other children, however, are perceptually biased to attend more to the words than the music (Welch *et al*, 1998).

These individual biases in children's socialisation need to be addressed by music education's pedagogical culture and practice. For example, an ideal pedagogical approach will be one that recognises a wide range of singing (or playing, or composing) behaviours is often evident amongst children of the same age and thus differentiates the curriculum to support musical development at the level of the individual (*pace* reading). However (and not withstanding the many excellent examples of music teaching in our schools), there is little evidence that knowledge of appropriate pedagogical differentiation generally exists

within the elementary school teacher population. A recent survey of the arts in teacher education reports an average of 30 hours being available for pre-service teacher education for the whole of the music curriculum in English undergraduate (BEd/BA) courses and only 16 hours on a one-year PGCE equivalent (Rogers. 1998)[10]. It is not surprising, therefore, that only 18% of the sample students surveyed reported themselves as 'confident' about teaching music.

In conclusion, the proposed model (fig 1) suggests that musical behaviours are subject to multi-dimensional developmental influences. At any given moment, for any particular child, musical behaviours will reflect biases in the previous interaction between these dimensions. Socialisation into the pathways of the dominant musical cultures can be both positive and negative, not least because some cultural mores are based on a restricted view of musical intelligence that allows some children to achieve their musical potential and others not to do so. Pedagogical practice can, and should, address established socio-cultural norms that perpetuate the processes and outcomes of negative musical experience in order to reduce the likelihood of individuals growing into adulthood with a shared identity of musical disability or inability. Recent developments in the musics of cathedrals and migrant groups offer us examples of the potential benefits of promoting both cultural transformation as well as cultural reproduction.

Although we have moved some way in our expectation of teachers of music since 1459 when Bishop Beckington issued his 'Statutes for the Choristers and Vicars' at Wells, the social forces and cultural imperatives that shape musical behaviour and development are equally powerful today.

> 'Such a person should be wise and discreet in judging which boys have capability, both from the point of view of their voices and for their natural disposition for taking on and carrying out the office of Chorister. Above all let the Master be chaste in his life that he may give a stainless example of purity to his boys and that he may the more firmly correct them in the event of any impurity. Also let the Master be someone who is always sober, keeping and ever observing discretion, temperance and moderation, punishing according to the gravity of the fault and the exigences of the time, ever having regard both to places and persons; and let him guide and teach with all diligence, lest through lack of the milk of doctrine and rule of conduct the lambs should perish under his hands or not grow to perfection as they should. Let him also be knowledgeable in grammar and sufficiently learned in song, both plain-song and prick-song ('cantu organico') lest the 'blind should lead the blind and both should fall into the ditch.' (Aelred Watkin, 1941:99; cited in Kerslake, 1998: 18)

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[1] Where the term socio-cultural is used in the text, it is to signify culture in relation to its social context. Similarly, socio-musical refers to music in relation to its social context.

[2] 'Naive' is used here in the sense of being inexperienced with respect to the particular musical genre.

[3] 'Sociology is the study of human social life, groups and societies' (Giddens, 1997: 2). This paper is an eclectic view of how certain aspects of musical development are shaped by these factors, noting some of the intended and unintended results of human action (Giddens, *op.cit.*: 15).

[4] By 1997 Salisbury, Exeter, Wells and York had established separate girls choirs in addition to those for the boys. Edinburgh had both boys and girls singing together in services. Bristol, Lincoln, Llandaff, Norwich, Peterborough, Ripon and Wakefield were planning to establish girls choirs in the very near future.

[5] The first song school at St. Paul's Cathedral can be traced back to 607AD (Sides, 1997).

[6] The growth rate of the membranous portion of the vocal folds is 0.4mm per year for girls and 0.7mm per year for males, leading to a maximum adult length for males of around 16mm and 10mm for females (Titze, 1994: 179). The growth phase is from birth to approximately age 20.

[7] This internal acoustic model is a product of the psychological phenomenon termed categorical perception and is based on previous individual experience of examples of such sounds (*of* Sergeant & Welch, 1997). Recent examples of categorical perception in speech perception studies may be found in Werker *et al*, 1998.

[8] Edelman, a Nobel laureate neuroscientist has estimated that the number of electro-physio-chemical events that occur inside human beings while carrying out daily activities is 'hyperastronomical', being about 'ten followed by millions of zeros'. (1992: 17).

[9] A ligand is any one of a variety of small molecules that specifically bind to a cell receptor and in so doing convey an informational message to the cell. (Pert, 1997: 350)

[10] Arguably, such sensitivity to a differentiated music curriculum will always be something of a challenge in school systems which provide less legitimation for music than other 'core' subjects such as English, mathematics and science. Music education often has marginal status in national curricula design, resulting in an inadequate time in pre-service teacher education courses, poor awareness amongst newly qualified teachers of any music development research literature that could improve practice, undifferentiated curriculum materials that mismatch with individual development needs and a school curriculum organisation that favours music teaching in large, often whole school, groups.

"Ayram": A Mexican Music Method for Children

Maria de Leon Arcila

Abstract

"Ayram" is a Mexican music method based on the idea of learning while playing. It was developed by Maria de Leon and Jorge Jara. The method is intended to assist children in their whole psycho-social development. This paper provides a description of the method.

Introduction

This method was conceived twelve years ago, based on the experiences obtained by teaching music to children three and four years old, along with the experiences of raising our own children in a musical environment since 1975 and looking forward to have better results in the whole development of the child not only as a music student but as a creative human being as well.

In 1986 I took a special course on Children Music Creativity given by Professor Pierre Van Hawe, from Holland. He taught how Kodaly had developed a solfeggio system for very young children, since the age of four and how this helped children to understand music. I thought that young Mexican children could easily learn this system because the syllables used to pronounce were easy for our children in their own language. I spoke to Prof. Van Hawe of the possibility of using his system with children two years old and in February 1987, the "AYRAM" method was first applied to babies nine months old and older, using Kodaly's solfeggio system as one of our subjects.

In the Mexican Republic, ours is the only school of its kind in the state of QuerÈtaro. We have been trying to make people aware of the importance music has in the life of human beings, not only because we want to provide the basis for future musicians, but because it is highly formative. The "AYRAM" program has nine levels:

MATERNAL	LEVEL I	LEVEL IV
PRE LEVEL I	LEVEL II	LEVEL V
PRE LEVEL II	LEVEL III	LEVEL VI

Children receive an hour class per week for the first six levels and for the last three levels they have a 75 minute class. From ages four and five, they will be able to begin with the study of an instrument. This can be wither piano, violin, psaltery, guitar or flute. In advanced levels they begin composing their own melodies, learn to recognize the different styles of composing, learn about the work and life of European composers and how musical instruments are constructed, and of course they continue with their psychomotor exercises and games for developing spatial and creative skills. There is also a choir and a folkloric orchestra which they can attend from the age of five.

In the "AYRAM" method we use the Kodaly solfège system just for the rhythmic reading. The melodic reading is done with melodies of our folk songs or children's songs drawn from other countries. Children begin rhythmic reading when they are eighteen months old with special notebooks, and begin to read notes when they are a year old. This works as a photographic memory at first, and little by little, depending on the work they do at home, they begin to read music easily at two and a half years old as an average. This is important for the acquisition of language, and also for melody and rhythm. We know music is composed of melody, rhythm, pitch, intensity and semantic. If a child is capable of recognizing sounds then this enables him/her to reproduce them. In his book, *Musictherapy*, Gerard Ducourneau (1988) emphazises the importance of music lessons to help acquire the basis of language, reading, writing, spelling and mathematics. Our system uses much singing, repetition, association, imitation (as corporal expression), memorization and concentration exercises.

Findings of the Program

The listening and concentration periods of one year old children are wider in babies that have received ear training continuously since the prenatal phase than for babies that begin at six months old with this kind of training. Dr. Berard said: "bad students are often people that do not know how to listen" (in Ducourneau, 1988, p. 33). And that is why in our school we pay much attention to ear training. Children attend school with their mothers until they are two years old, bonding with them, feeling secure, singing a lot so they begin to speak more fluently, gaining a larger vocabulary, walking by themselves earlier than the average, that is between ten and fourteen months old, this is due also to the psychomotor exercises that are done with baroque and folkloric music.

Children develop skills that improve their capacity for learning at school, for example, being able to concentrate for three minutes without any interruption at the age of one year and increasing the time up to ten and fifteen minutes at the age of two. This makes it easier to work on activities that require absolute concentration in order to be performed. We have seen that in a group of ten babies, eight develop this ability of complete concentration without any difficulty. This is even better if at home mother plays with their child so that they are able to listen attentively to the musical instrument sounds for three minutes at least every day. The favorable conditions for reaching this are:

Mother likes music.
Ear training exercises are performed daily or at least 3 more outside classes.
The child is healthy.
The child has come to music lessons since pregnancy.
Father supports the idea of playing music with the child.
Not a spoiled child.
Has complete instrument material and cassettes at home.

The amazing results with these children and the findings of studies such as those conducted by Rauscher et al (1995, 1997); Verny (1991); and Tomatis (in Gilmour, 1982) provide the motivation for us to continue with our Prenatal Music Stimulation Program that began in October 1993. In this program we have:

80% baroque and classical music
20% Mexican folk music
they begin at the 16th week of pregnancy
they come to class once a week
I prepare a cassette with selected music to be used during childbirth.

In order to relax the mother to be, we make vocalization exercises and sing simple lullabies to help her feel comfortable singing to the baby when s/he is born. Singing to the baby while s/he is still in the uterus helps also the parents to be more conscious of what a human being is, being aware of the baby's feelings, learning how to communicate with their child and teaching values, telling them stories that involve these matters and trying to make them part of their future behavior.

Edgar Willems differentiated in three aspects about what good hearing is: babies receive music by involuntary activity, being agreeable and being conscious, so this auditive intelligence begins to appear. It has also been reported that unborn children respond favorably to portions of Vivaldi and Mozart, but with hyperactivity to rock music and other heavy classical compositions (Verny, 1991). We have observed that not only portions of these composers help to soothe the babies, but there are others from a varied group of baroque composers that contribute to obtain the same results. In our prenatal and early stimulation music program we listen to a great number of baroque suites and classical concertos, mainly the adagios and andantes for massage, meditation, and some relaxing exercises; and the allegros for rhythmic exercises with percussion instruments not longer that 3 minutes; the fetus reacts with more movement when the mother listens to trumpet, mandolin and flute concertos than when other kind of musical instruments; that is why we also use our folk music that is very brilliant.

To soothe the baby we listen to violin, harp, guitar, oboe, French horn and some piano concertos, but then again only portions of them. After the child is born, it is suggested that s/he listens to music from: Vivaldi, J.S. Bach, Telemann, Handel, Mercadante, Purcell, Rameau, Lully, Albinoni, Pachelbel, Mozart and Scarlatti. Peter Hepper in 1988, had demonstrated that the prenates of mothers that have listened to a specific "soap opera" theme music during pregnancy, showed a preference for the same music during the postnatal period. We choose specific compositions for resting and exercising. The music used at a child's birth is frequently used for the baby's sleeping periods and has to be music that the mother likes best. Our records show that from a study of 90 babies with this pre-natal program and continuing to listen music during the day and specially at night before sleeping:

Babies slept from 10 P.M. to 7 A.M. continuously
90% being 16 weeks old,
7% being 10 weeks old, and
3% at 8 days old.

Dr. David Chamberlain, from San Diego, California, in 1992, pointed to the surprising musical intelligence demonstrated by prenates. In a hospital nursery they had premature infants hearing Brahms' Lullaby, and this accelerated growth and were discharged sooner than babies that had not been stimulated with music (Chapman, in Sallenbach, 1988).

When a baby is born before due time it is suggested that s/he listens to music constantly while in the incubator. Normally they increase their weight from 15 to 25 gr. per day; while having music in the incubator, they increase from 40 to 60 gr. per day. We have been doing so with some babies even with hydrocephalia or having had brain strokes, and as part of their recovery therapy, they will listen to music daily.

Conclusion

Ear training for babies since pregnancy helps them to acquire a wider period of listening and concentration by the age of a year that could be of three minutes without any interruption, and this time increases up to ten minutes of concentration in an activity by the age of two. Beginning ear training when they are six to twelve months old gives us the same results at years old, and then increasing the time up to ten minutes at the age of three. There is a case of a girl of four years and seven months old, that is able to concentrate without being bored in her thirty minute piano lessons. She went under this ear training program. This can help not only for learning how to play an instrument but for acquiring other types of knowledge at school. The results of our research suggest that ear training from an early age could be a support for acquiring a firm basis in any knowledge area.

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Music Curriculum in Primary Schools: A Comparison Between Hong Kong and Xiamen, China

So Ming-chuen Allison

Abstract

Western style of music learning has long been the focus of the music curriculum in Hong Kong whereas Chinese music was undermined. With the return of sovereignty to China in 1997, Hong Kong became the Special Administrative Region (SAR). Education reform is a top priority. The main purpose of this research is to investigate the similarities and differences of the music curriculum in Hong Kong and Xiamen (city in Fujian Province, China). The main foci will be 1) the proportion of Western and Chinese music in the curriculum; 2) to what extent does the teacher follow the curriculum; 3) the difference in teaching method in conducting the curriculum.

Introduction

Before the return of sovereignty to China, Hong Kong had been under British colonial rule for over 150 years. Political and cultural events as well as the education system were deeply influenced by Britain during this period. As far as music education is concerned, traditional Western music learning played an important part, including the learning of piano and western music appreciation. Traditional Chinese music, however, has been neglected in the school music curriculum

Xiamen, a major port in Fujian Province in China, has been in contact with the West since the last century for its tea-trade. Western-styled houses were built in Gulang Island, also traditionally famed for its musicians, and bear the name 'the Piano Island'. Thought many students study piano, the playing of Chinese traditional instruments is more popular among schools in this region. Both Hong Kong and Xiamen have western influences, so this paper aims to investigate the similarities and differences of the primary school music curriculum in these two places.

The Primary School Music Curriculum in China

Because of too much involvement with politics, music in school was relatively unimportant apart from the singing of political songs. During the "Cultural Revolution" in 1966-1978 music education came to a halt in schools. From 1980 onwards, because of political reforms and the opening up of the country, major changes in music education occurred.

1. In 1986, a nine-year compulsory education, i.e. six years primary and three years middle school (in cities), or five years primary and four years middle school (in countryside) was implemented.
2. Music lessons became compulsory in all schools. The Music Instructional Plan stipulated two music lessons per week in all primary schools. An extra hour for music games was added to primary one and two in city schools that run the 6-year system.
3. Musicians were admitted to the governments' Artistic Education Committee that reviewed the Musical Instructional Programme and examined published music materials.
4. The government-owned People's Music Publisher published a complete set of text books and teachers' books, tapes and other teaching-aids, which closely followed the guidelines from the Music Instructional Plan. This provides a sample for other publishers to write their own textbooks with standard suitable for their provinces or cities.

The Curriculum

Aims: Music belongs to the category of aesthetic education and aims to: nurture higher disposition and aesthetic taste among students; raise the quality of culture and arts in the whole country. It also serves to establish spiritual civilization in a socialist country.

Content: Music lesson includes singing, singing games (this is an extra lesson for primary 1 and 2 only), learning of musical instrument, music appreciation, fundamentals of Music Theory, sight-reading and aural. The content for each item is laid-out. Chinese traditional instruments are emphasized for instrumental learning. While more emphasis is placed on

Chinese folk songs and Chinese instrumental and ensemble music, a selection of Western classical music is also included.

The Primary School Music Curriculum in Hong Kong

Since Hong Kong has long been under the British rule, the school music curriculum naturally has placed more emphasis on Western music. Despite the inclusion of Chinese music towards the return to China in 1997, traditional Western music learning still plays an important role in Hong Kong music education. The primary school music syllabus, revised in 1987 by the Curriculum Development Committee, did not specify the use of Chinese music, nor did they specify Western music either. Apart from this, there are similarities with that in China:

1. A nine-year compulsory education was imposed, i.e. six years primary and three years secondary schools.
2. Music lessons are made compulsory in all schools. Two lessons per week or cycle are recommended, but not stipulated.
3. The Music Subject Committee (Primary) of the Curriculum Development Committee prepared the music syllabus. The members include heads and teachers from government and non-government schools, representatives of universities, and officers of the Advisory Inspectorate and other Divisions of the Education Department.
4. Unlike China, there is no official publisher for textbooks. This results in many different editions of textbooks. Textbook writers are usually musicians or music educators.

The Curriculum

Aims: To foster a wide variety of music making experiences through practical involvement in playing, singing, listening and creative activities. To develop aural awareness and musical perception, and to develop personal qualities of self-discipline, self-expression through the practice of music.

Content: Music lessons include singing, music reading (rhythm, pitch, sight-reading), listening, and other activities, including instrumental playing, movement, and creative activities.

Comparison Between the Primary Music Syllabi

Table 1 provides an overview of the similarities and differences between both recent music syllabi.

Table 1: Comparison between Hong Kong and Chinese Music Syllabi

Hong Kong	China
a. The word 'syllabus' is used.	The word 'Music Instructional Plan' is used.
b. Already the third revision.	Temporary version, still waiting for feedback.
c. A separate syllabus for Primary 1 to 6..	Separate syllabus: for Primary 1-2, 3-5, and 6. No specific syllabus for Primary 6: a consolidation.
d. More detailed: separate columns for instructional objectives/contents and remarks	Rather general description, without separate columns.
e. Too much emphasis on theoretical side	Aims to provide general knowledge in music theory.
f. No singing game lesson	Singing game lessons for primary 1 and 2, to avoid a big change in music experiences from kindergarten.
g. For 'singing', songs include Folksong, unison, two-part etc,	Emphasis on singing technique and correct posture
h. Didn't specify the type of music for music appreciation.	Pieces heard are specified, both Chinese and English songs.

Music in Primary schools in Xiamen and Hong Kong

In order to investigate how the music curriculums are implemented in these two places, observation of music lessons and interview with music teachers were conducted between September and November 1998. A total of eight primary schools were chosen, four in Xiamen and four in Hong Kong. The investigation was intended not to provide a detailed picture, but rather an overview summary.

The major difference is the qualification of the music teachers. All music teachers in China are music graduates, either from university music department, music institutions or teachers' training colleges. They teach only music, thus providing them with ample time to conduct plenty of extra-curricular activities and the planning of the music lessons. The schools that I visited have three to four full-time music teachers. In Hong Kong, not every primary music teacher are trained-teachers, and some have not even studied music before – they only can play the piano. The number of music teachers varies from two to eight. Apart from teaching music, they have to teach at least two other subjects as well.

One private school in Xiamen, in addition to three music lessons a week in primary 1 and 2 (two normal lessons and one singing-games lesson), has a dancing class. Because not every school can afford to have such a lesson, there is no written document of the curriculum from the government. The teacher himself is a professional dancer, who graduated from the Beijing Dance Academy. The lessons included basic dance steps and movements, plus some concept of Dalcroze. This provide students with a strong rhythmic sense, as well as a feeling toward music, thus helping with their music lessons. In Hong Kong, because of the strong emphasis on academic subjects as well as discipline problems, it is difficult to conduct such a class.

As for instrumental learning, the curriculum in China requires students to learn a traditional Chinese instrument from primary three onwards, in addition to classroom instruments. The Hong Kong syllabus only suggests that students learn recorder, harmonica or melodia without stipulating the standard required. Of the four schools visited in Xiamen, one school is a boarding school. Students learn musical instruments after school every Tuesday and Thursday for one hour. There is a total of 38 practice rooms, all with pianos. Students can choose from instrumental classes taught by their music teachers, this includes piano, electric piano, violin, cello, brass, erhu, pipa and so on. All lessons are provided free of charge for the students.

In another school in Xiamen, both students and a teacher (not music teacher) learn the instrument together. The instructor comes in every Saturday, and students and teacher have to pay for the lessons as well as to buy their own musical instruments. The school also has a well-organized Chinese orchestra, and students all play from memory. In Hong Kong, some schools provide instrumental classes as well as orchestras as extra-curricular activities, but it is not incorporated as part of the curriculum.

For singing classes, both Xiamen and Hong Kong adopted the tonic so-fa system, however, one school I visited uses solfeggio from primary one, and students have a rather tough sight-singing and aural lesson every week.

Regarding creative activities and movements, Hong Kong teachers and students are more active and energetic, whereas those in China are more 'timid'. However, when answering questions, students from China are well organized and well presented, whereas our Hong Kong students are much 'shy'.

Conclusions

Judging at both curriculums, the one in China provides a more general guideline – it does not specify exactly what should be taught in a specific year, whereas the Hong Kong syllabus provide a more detailed itemisation for each year, with suggestions and methodology too.

In China, the publisher provides all the teaching aids including song sheets, guidelines, and tapes with recording of all the songs with voice and accompaniment, and with accompaniment alone, together with the music for music appreciation classes. This will save teachers time in finding suitable recordings. For Hong Kong, tapes or CDs are provided for teachers, but not music for appreciation. Sometimes, teachers have to use a lot of time in preparing teaching materials on top of their preparation of other subjects. However, this gives teachers more flexibility in how they teach, rather than following a strict method book apprach, as in the case of China.

The Chinese curriculum places a strong emphasis on the technical side, such as singing and instrumental playing. Also they tend to imitate what the teacher tells them to do, without letting their students feel the music. The syllabus in Hong Kong, on the other hand, is too ambitious. Less emphasis should be place on the theoretical part. A cross-examination and comparison of Chinese and Western music is necessary, rather than being separated into Chinese and Western music.

This paper only gives an overview of the music curriculum of Hong Kong and Xiamen, and forms only the first part of my research topic.

Enactive and Reflective Thinking During the Compositional Process by Seventh-Grade Korean Students

Myung-sook Auh

Abstract

The purpose of the study was to examine students' enactive and reflective thinking during the compositional process. Subjects were 20 seventh-grade Korean students enrolled in junior high schools in Seoul, Korea. They were asked to compose music and, subsequently, to describe how they composed music on the Compositional Process Questionnaire. The results showed that students tended to think enactively and/or reflectively in the beginning stages of the compositional process; however, when developing musical ideas to expand their composition, most of them tended to think more reflectivly than enactively. Also, while enactive thinkers tended to sing, hum, and/or play on their instrument looking for tunes, reflective thinkers tended to make detailed musical-analytical strategies and make their own strategies, such as "composing is like craftsmanship" and "doing a puzzle", employing auditory and visual images for composing. Implications of these findings suggest that students' descriptions of how they compose can give music teachers insight into how their students might think when composing and lead to better instruction in composition.

Theoretical Background

Researchers have investigated different thinking types and their relationships with creative products. Schmidt and Sinor (1986) examined relationships between impulsive and reflective cognitive styles and musical creativity of second-grade children. Impulsive and reflective cognitive styles were measured by the Matching Familiar Figures Test (MFF) (Kagan, 1964). Musical creativity was measured by Webster's Measure of Creative Thinking in Music (Webster, 1987), which uses improvisation tasks. They found no significant relationships between any of impulsive and reflective cognitive styles and improvisational creativity. In Kratus' (1990) study of characterization of the compositional strategies used by children, it was found that high-success subjects used less Exploration (exploring musical ideas) and more Development (developing tonal and rhythmic patterns) and Repetition (repeating musical ideas to consolidate them in their head) than low-success subjects did. The thinking processes in Exploration and Repetition can be thought of in terms of Enactive vs. Reflective thinking processes (Development can be both Enactive and Reflective), as mentioned by Davidson and Welsh (1988).

Davidson and Welsh (1988) examined the compositional process in 5 beginning and 5 experienced music conservatory students, focusing on tonal thinking while composing. They asked students to compose music using a given rhythm pattern in 14 measures and modulating from C major through F sharp major back to C major. The students were instructed to compose on staff paper without erasing any mistakes that they made while composing, and continue on the next line. The condition of continuing to notate without erasing mistakes could allow the researchers to trace the students' tonal thinking. The study found that the beginners showed a more enactive thinking process by sounding out notes on the piano and exploring all possible notes on the piano. However, the experienced students showed more reflective than enactive thinking processes by defining the dimensions of their composition task and searching for methods to achieve it. They were able to think of their music within the big picture, as they evaluated whether new musical ideas would fit into the whole music with coherence.

Folkestad, Hargreaves, and Lindström's (1998) study of strategies for composition tasks using computers showed two types of strategies: 1) horizontal and 2) vertical. Horizontal strategy means that students complete first the form and contents of their composition using either keyboard or computer, and then do the arrangement and instrumentation of the music using the computer; thus "composition and arrangement are separate processes" (p. 88). On the other hand, when using a vertical strategy, students produce the form and contents of compositions and their arrangement and instrumentation at the same time, i.e., vertically, on the computer; thus, "composition and arrangement/instrumentation are conceived as one integrated process" (p. 91). Folkestad et al. stated that the vertical strategy is more advanced than the horizontal

strategy, because those using the vertical strategy have almost completed the music in their head and just transfer the music into the computer, transcribing it in vertical forms. However, this categorization of compositional strategies may be bound to the computer-related task itself.

Although there are some studies on different thinking processes and strategies employed in composing music, as reviewed above, many of the aspects need further clarification. This study investigated enactive and reflective thinking during the compositional process by analyzing students' descriptions of how they composed from the beginning to the end in an open-ended questionnaire. Also, this study is an attempt to develop a methodology for investigating thinking processes during the act of composition.

Purpose

The purpose of the study was to examine students' enactive and reflective thinking during the compositional process. The following research questions were raised in this study:

1. How do students think in terms of enactive and reflective thinking during the compositional process?
2. What are exemplary statements of enactive and reflective thinking during the compositional process?
3. Are there significant differences in enactive and reflective thinking by gender?

Definitions

Enactive thinkers tend to, first, act out and then think about what they are doing. Reflective thinkers tend to, first, think about what and how they are going to do, and then act out following their strategies. Also, reflective thinkers are able to describe why they are doing what they are doing, while enactive thinkers are unaware of what they are doing and why they are doing it. If enactive thinkers are asked why they are doing it, they say, "I don't know, I just do it" or "I just like it". Davidson and Welsh (1988) described enactive and reflective thinking as follows. Enactive thinking refers to the way that students enactively sound out notes on instruments and explore musical ideas by playing on instruments, looking for the sounds that they want. Thus, enactive thinkers' final compositions emerge as they work on. The reflective thinking process refers to the way that students are able to think about their composition task before playing on instruments and also during the composition; they understand what the task is, make strategies to solve the task, and have a big picture of what their final composition will be.

Methods

Subjects

Subjects were 20 seventh-grade students (N = 20; 10 males, 10 females) attending junior high schools in Seoul, Korea. The students were selected on the basis of high verbal ability and above average musical achievement and academic achievement. Therefore, the subjects were homogeneous in terms of these three variables.

The Compositional Process Questionnaire

The Compositional Process Questionnaire was used to collect data on students' thinking during the compositional process. The Questionnaire consisted of 8 questions. Questions 1 - 5 were about how they composed from the beginning to the end. Questions 6 - 8 were about intention of expression, artistic sense, and self-evaluation. The quesions are shown in the following:

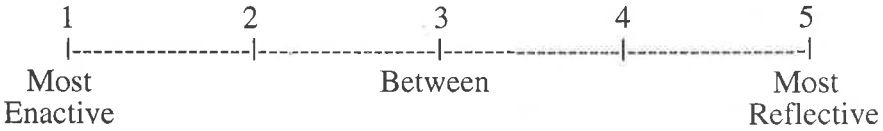
1. How did you get the first idea for your composition?
2. How did you connect from the beginning to the next part?
3. How did you select musical ideas for the middle part?
4. How did you develop musical ideas?
5. How did you end your composition?
6. Did you express any specific feelings, story, etc. in your composition?
7. What did you like most in your composition?
8. Do you think your composition is done well or not, and why do you think so?

Sloboda (1985), citing Ericsson and Simon (1980), emphasized that verbal reports made *concurrent* [italics not mine] with an act can be as reliable as any other data by giving the most detailed and accurate picture of the act. Therefore, students' written descriptions on the questionnaire were accepted as reliable data for this study.

Procedure

Students were asked to compose music in groups of 10 after their class ended. They were given a maximum of 30 minutes for composing. They composed on instruments of their choice and also were asked to notate their composition on staff paper. After they finished composing, they were asked to describe their thinking during the composition in the Compositional Process Questionnaire. Students' descriptions in the Questionnaire were evaluated by two judges for Enactive and Reflective thinking. The descriptions, which were originally written in Korean, were translated into English by the researcher for judges' evaluations. The two judges were the investigator herself and a researcher who is an expert in musical creativity research. 5-point rating scales, which are shown in the following, were used for the evaluation:

Rating Scale: Enactive vs. Reflective thinking(1 - 5)



Results

Interjudge Reliability

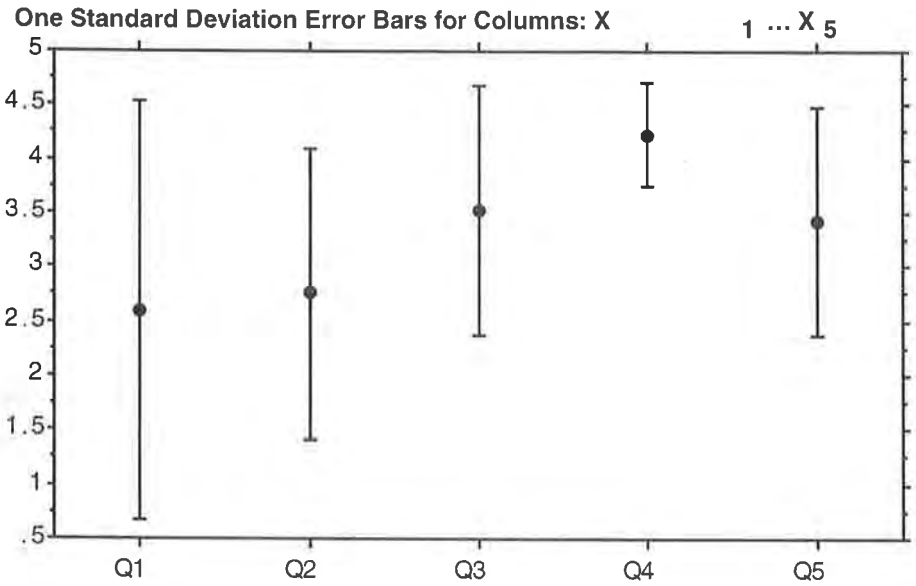
The two judges' ratings of students' responses were correlated to compute interjudge reliability, using *Pearson product-moment correlation*. Here, total scores of the ratings for the 8 questions were used. The interjudge reliability was: $r = .90$. Agreements between the judges' ratings was also computed, because the interjudge reliability using total scores of ratings could not give information on judges' agreements for each question. Agreements between the judges for each of the questions ranged from 99% to 66 %, except one case (13%). The exceptional case was partly due to high concentration of ratings around mean (M = 4.23, SD = .47; also see Figure 1), but the two judges disagreed on whether to rate 4 or 5. Thus, the low percentage of agreement does not indicate a disagreement on the wider scale of enactive versus reflective. Agreements for each of the questions were: Q1 - 99%; Q2 - 69%; Q3 - 94%; Q4 - 13%; Q5 - 66%; Q6 - 96%; Q7 - 81%; Q8 - 85%. Mean of the agreements was: $M = 75\%$.

Enactive and Reflective Thinking: Quantitative Analysis

How do students think in terms of enactive and reflective thinking during the compositional process? Their thinking ranges from most enactive to most reflective, with Mean of 2.6, for the beginning stage (Question 1). However, when developing musical ideas from the middle part and onward, they tended to think most reflectively: Mean = 4.23. When they asked about their intention of expression, favorite part, and self-evaluation, they were more reflective than at the beginning stage of the compositional process. Figure 1 shows ratings for students' enactive and reflective thinking during the compositional process. Also, means and standard deviations of the total ratings for each of the questions are shown in Table 1. It should be noticed that ratings for Question 4 were highly concentrated around the Mean within a range of 1.5 points. The concentrated ratings partly contributed to extremely low agreement between judges' ratings for the question 4.

Figure 1. Students' Enactive and Reflective Thinking During the Compositional Process

Q1 - Q5



Q1 - Q8

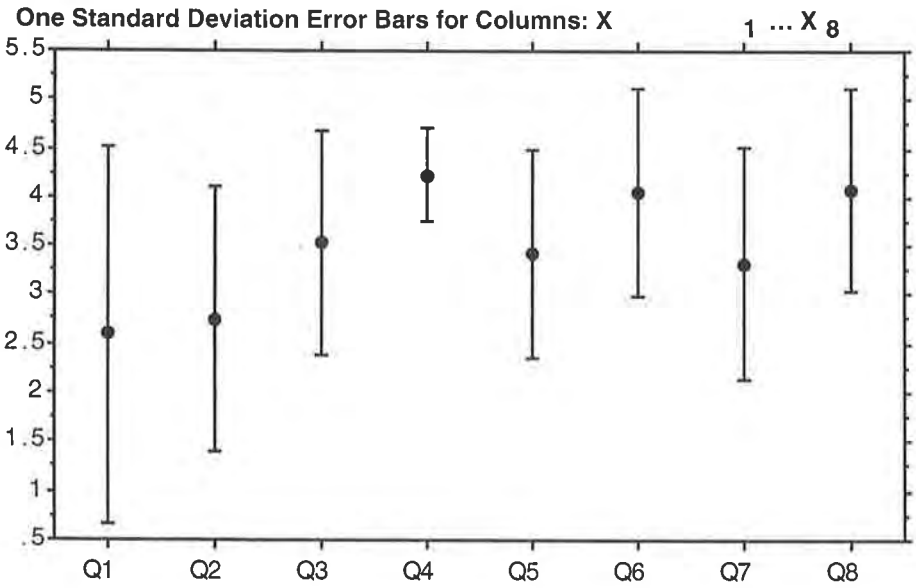


Table 1. Means and Standard Deviations of the Total Ratings for the Questions

Question ($N = 20$)	*M*	*SD*	*SE*	Min.- Max.
Question 1	2.60	1.92	.43	1 - 5
Question 2	2.75	1.35	.30	1 - 5
Question 3	3.53	1.15	.26	1 - 5
Question 4	4.23	.47	.11	3.5 - 5
Question 5	3.43	1.07	.24	1 - 5
Question 6	4.05	1.06	.24	1 - 5
Question 7	3.33	1.20	.27	2 - 5
Question 8	4.08	1.03	.23	1 - 5
Total	27.98	5.98	1.34	14 - 37.5

Notes: The maximum score for each of the questions is 5. The maximum score for Total of the questions is 40.

In order to investigate how many of the subjects were deemed to be Enactive and Reflective thinkers during the process of composition, the individual students' total ratings for the questions were compared. It was found that the subjects showed more reflective than enactive thinking during the compositional process. Only one student was rated an Enactive thinker, and 4 students were rated Reflective thinkers. The numbers of students for the categorization are as follows:

Categories	Ratings	Number of students
Enactive	8 - 16	1
Somewhat Enactive	17 - 24	5
Somewhat Reflective	25 - 32	10
Reflective	33 - 40	4

It is beyond the scope of this study to analyze what compositions the students made. However, it would be interesting to see what compositions the Enactive and Reflective thinkers actually made. Students' performances of the compositions were videotape-recorded, while they also notated their compositions on staff paper to remember when performing it. Here, only their notations are included in this paper. (Contact the investigator for the videotape-recording.) Figure 2 shows the notations of the compositions by an Enactive thinker (#20) and Reflective thinkers (#2, #3, #4, #17).

Enactive and Reflective Thinking: Qualitative Analysis

Students' descriptions in the Compositional Process Questionnaire were analyzed by categorizing them into similar responses. The qualitative analysis yielded the following categories of students' enactive and reflective thinking during the compositional process:

Q1. How started?

Enactive: By singing and humming, or playing on an instrument.

Reflective: Recalled tunes that I could hear many times.
Wrote down tunes that occurred to me.
With the tunes that impressed me in the past.
Making music is my habit.

Q2. How connected to the next?

Enactive: Played the first part again looking for notes for the next.

Reflective: Used detailed musical-analytical strategies.
Thought hard.

Q3. How chose the middle part?

Enactive: Played tunes again.

Reflective: Used detailed musical-analytical strategies.
Made my own strategy.
Already in my own head.
Expresses what I wanted to express.
Tunes from a memory.
Auditory image

Q4. How developed musical ideas?

Enactive: none

Reflective: Used detailed musical-analytical strategies.
Made my own strategy.
Wrote down musical ideas that occurred to me.
Visual image
Feelings & thoughts
Listened again & thought about it.

Q5. How did you end your composition?

Enactive: Sounded like ending.
Don't know.

Reflective: Used detailed musical-analytical strategies.
Already in my head.

Q6. Expressed something?

Enactive: Just a good feeling

Reflective: Feelings & thoughts
Visual image
Occurred to me and I liked it.
Wanted to make original music
Did not express.

Q7. The most favorite part?

Enactive: Simple description without further explanation.

Reflective: Because: Musical-analytical reasons
Because: The sounds
Because: Describes what I wanted to express.
Because: Worked hard for it.

Q8. Self-evaluation

Enactive: Simple judgment without why.

Reflective: Why: Musical-analytical reasons
Why: The sounds
Why: Achieved what I wanted to express
Why: I did my best.
Why: Comparing with peers.

The analysis showed that enactive thinkers sang, hummed, and/or played on an instrument looking for tunes that they like, and did not have clear reasons for their decisions, such as why they liked a certain part of their composition and why they thought their compositions were good or bad. On the other hand, reflective thinkers tended to have musical ideas already in their head and just wrote them down on staff paper to make music with them; they could come up with their own strategies for composing music; some of them used auditory and/or visual images for composing music and also recalled certain melodies that impressed them in the past; and also they had clear reasons for their decisions on their favorite part and self-evaluation.

Gender Difference in Enactive and Reflective Thinking

There were no significant differences in enactive and reflective thinking by gender among the subjects (see Table 2).

Table 2. Gender Differences in Enactive and Reflective Thinking

Gender ($df = 18$)	*N*	*M*	*SD*	*t*	*p*	
Male	10	29.4	5.65	1.07	.30	N.S.
Female	10	26.55	6.25			

Notes: $p < .05$ was chosen for this study.

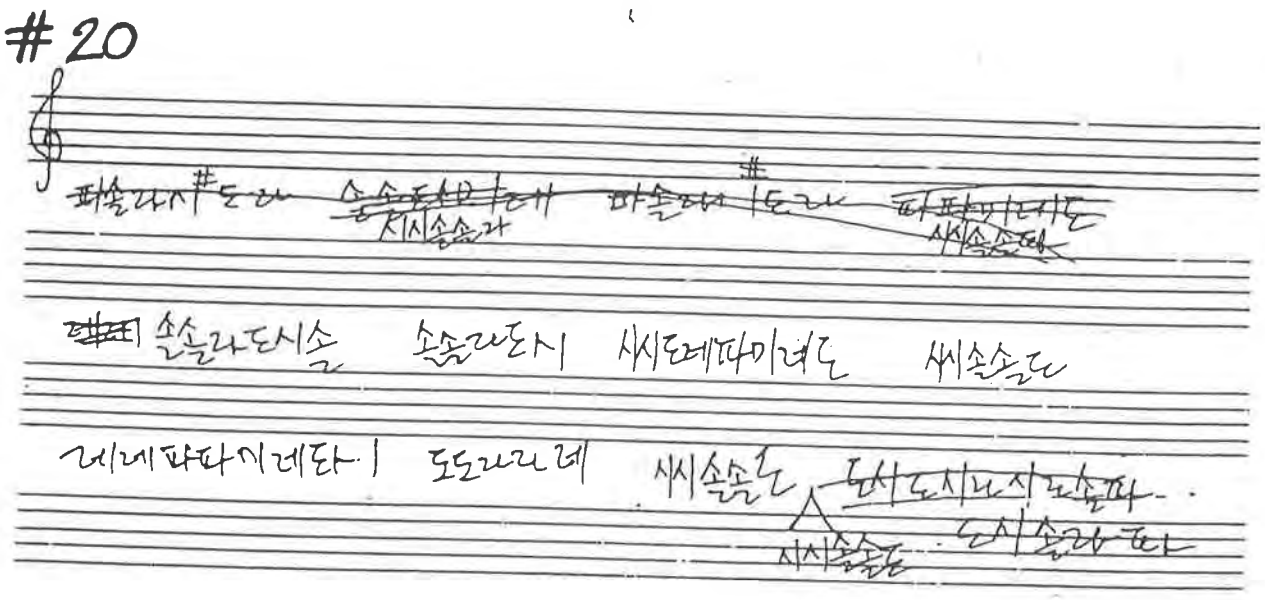
Discussion

This is a preliminary study to explore how students think during the compositional process. The results showed that students tended to think enactively and/or reflectively in the beginning stages of the compositional process; however, when developing musical ideas to expand their composition, most of them tended to think more reflectivly than enactively. Also, while enactive thinkers tended to sing, hum, and/or play on their instrument looking for tunes, reflective thinkers tended to make detailed musical-analytical strategies and make their own strategies, such as "composing is like craftsmanship" and "doing a puzzle", and also employ auditory and visual images for composing. No significant gender difference in enactive and reflective thinking confirmed that boys could be as reflective as girls in composing.

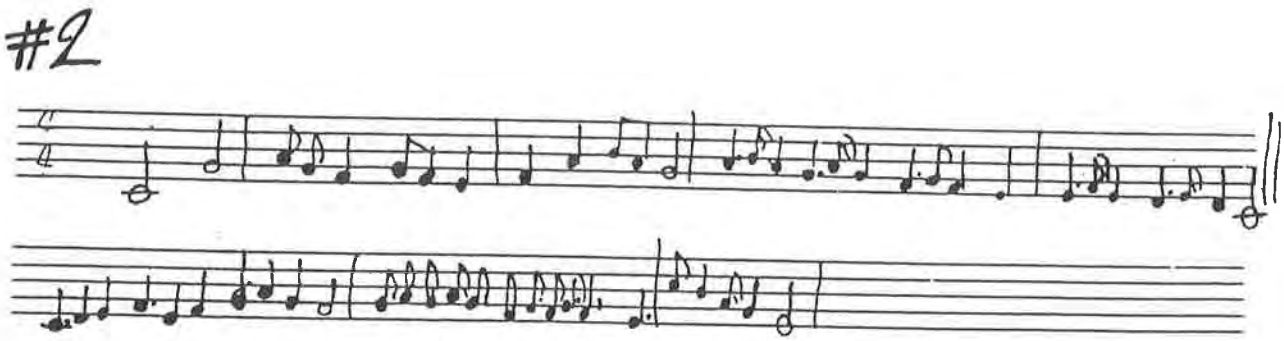
Students' descriptions of how they composed can give music teachers an insight on how their students might think when composing. Such an insight can possibly lead to a better instruction in composition. Whether reflective thinking is more advanced than enactive thinking is not addressed in this study. A further study will investigate relationships between the enactive and reflective thinking and success and creativity of compositions by the students. Also, I suspect that the enactive and reflective thinking might be related to divergent and convergent thinking, i.e., the two important thinking types occuring during creative process. However, the definitions and categorizations of the enactive/reflective thinking and divergent/convergent thinking are not yet clear. Further research is needed to clarify that.

Figure 2. Enactive and Reflective Thinkers' Notations of Their Compositions.

Enactive thinker (#20)



Reflective thinkers (#2, #3, #4, #17)



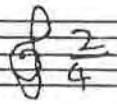
#3 왕눈이 아주기

도도솔라 미미레도 도도솔라 미미레

도도시라 솔파미레 솔라솔파 솔

도도 솔라 미미레도 도도솔라 미미레도

#4 빨간 내복을



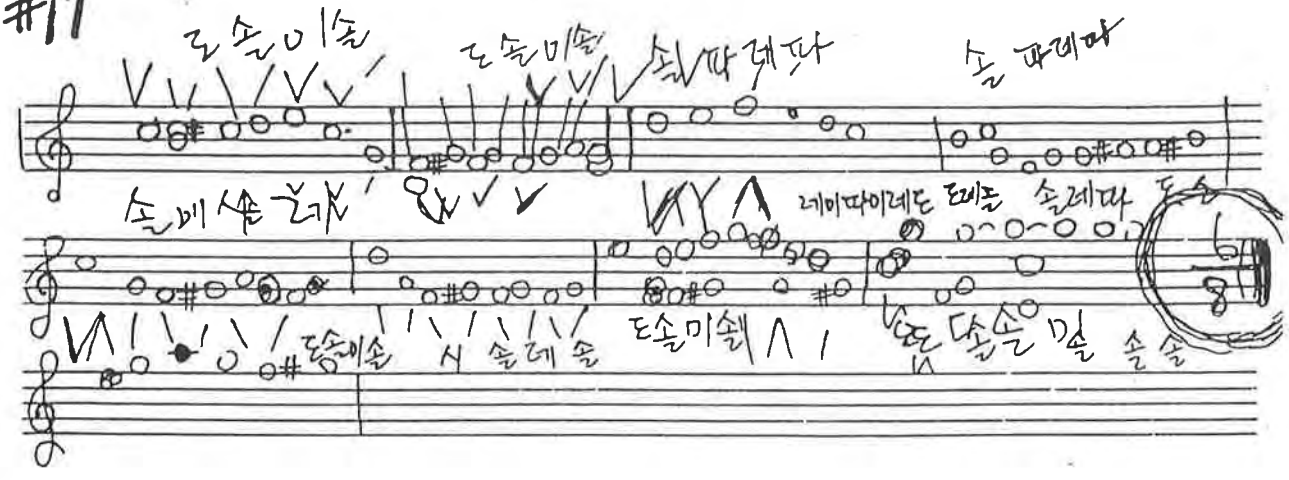
도레미파 솔솔 레레파미

미-미 파 솔라솔 레미레미 도

레 레 레미레 미도마라 솔

솔미솔도 라솔파 레도레미 도

#17



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The Syncopated Pattern Originated from Weakened Mora in Japanese Pop Songs from the 60's to the 90's.

Nozomi Azechi

Abstract

This paper provides a description of an investigation into the incapacity of older Japanese people to sing popular songs of the 90's, and probes the reasons for this phenomenon.

Introduction

This study attempts to investigate a basic question about Japanese pop songs: "Why can't older Japanese people sing pop songs of the 90's?" If we reflect on the question, we must make an analysis on the rhythmic structure of the Japanese pop song. Though when we think about the reason older Japanese are unable to successfully sing pop songs, the key element to consider is the pitch. But we have to keep in mind that whilst older Japanese cannot sing pop songs of the 90's, most of them are capable of singing older Japanese songs. This highlights the fact that pitch is not the principal cause of older Japanese' singing disability, but the rhythm is.

Some experimental studies have investigated this problem. Murao and Mito (1997) state that the generation gap in rhythmic schema was caused by the change of pop music. They demonstrated that the change of pop music is due to the relationship between rhythm and text. Their studies and review of other literature show a lack of analysis regarding the rhythmic structure of Japanese pop songs. There were many studies of scale about Japanese pop songs. But there weren't studies which looked at rhythm. So we are still not sure about how the rhythmic structure changed in the past four decades.

Purposes

The purposes of this study are: 1) to make clear the change of rhythmic structure in the past four decades and, 2) to clarify the relationship between rhythm and text in Japanese pop songs. To analyse the change of rhythmic structure, this study compares WARABE-UTA (Japanese traditional chiIdren's songs), with pop songs from the past four decades. Concerning WARABE-UTA, Koizumi's study was the most famous. This study applies Koizumi's method and additionally uses mora (the minimal metrical unit) to analyze quantitatively the rhythmic structure of Japanese pop songs.

Mora

Languages were classified into two types according to the rhythm when it was spoken. They were called stress-timed rhythm language (typical languages were English and German), and syllable-timed rhythm language (typical languages were French and Japanese). On the other hand, languages were classified into two types according to the differences between the minimal unit. These are syllable languages (English, German, and French) and mora languages (Japanese and Italian). In the first classification, Japanese was included as a syllable-timed rhythm language. But Japanese is a mora language. So Kubozono, a Japanese linguist, wrote that the Japanese rhythmic characteristic is mora-timed rhythm. And the unique characteristic of Japanese rhythm is that they kept the same duration of mora. In Japanese, every mora has the same duration. The following are Japanese mora characteristics.

1. Each mora is equivalent to each sound when Japanese was spoken clearly.
2. Each mora is equivalent to each letter of the cursive syllabary (HIRAGANA) and the square form (KATAKANA) of it.
3. Each mora keeps the same duration.

Although in a natural Japanese conversation, not every mora is treated equal. Some mora don't keep the same duration. These mora are called weakened mora. Japanese mora has two types; mora and weakened mora. Weakened mora works as a part of syllable.

Database

To begin this study, the first step was to make a database of rhythms by the number of mora. To make the database, I divided the text into each metrical phrase. Similarly, I divided the rhythm of songs by each metrical phrase. The number of mora indicates the rhythmic structure. The objects were two hundred Japanese pop songs. I chose fifty songs about each decade. These were chosen from every decade's top 100 of Oricon Hit Chart. And I wasn't concerned in this study with ENKA.

Method

Analysis I

The first step was an analysis of 3+ α mora structures. In this analysis, I collected divided phrases that had 3+ α mora structures, and analyzed the rhythmic structure at the connection point of the 3 mora word and the next word. Three patterns were found on the 3+α mora structures.

Pattern A: Typical rhythm patterns were defined by Koizumi in his paper.
Pattern B: Variations from within the ordinary rules of Japanese poetry.
Pattern C: Variations from out of the ordinary rules of Japanese poetry.

Pattern C has congruent points between metric accent and the closure points of 3+ α mora patterns. I analyzed percentage of the three patterns about four decades. The second step was an analysis of Pattern C. I checked the duration of third notes to analyze the duration of basic beat. As the third step, I analyzed the relationship of duration between third notes and fourth notes.

Findings

Table 1-la The Amounts of Three Patterns

	60's	70's	80's	90's	Total
Pattern A	118	96	109	59	382
Pattern B	43	72	76	79	270
Pattern C	33	120	141	202	496
Total	194	288	326	340	1148

p<.

00011

Table 1-lb The Percentage of Three Patterns

	60's	70's	80's	90's
Pattern A	61%	33%	33%	17%
Pattern B	22%	25%	23%	23%
Pattern C	17%	42%	44%	60%

Table 1-lb shows that amounts of Pattern A & Pattern C in the 60's is reversed in the 90's. Pattern A, typical rhythm patterns of Japanese old songs, has decreased. And Pattern C, variations from out of the ordinary rules of Japanese poetry, has increased.

Table 1-2a The duration of 3rd note in Pattern C

	60's	70's	80's	90's	Total
♩	22	43	31	52	148
♪	11	59	95	130	295
♬	0	18	15	20	53
total	33	120	141	202	496

*♩ means quarter note and longer than quarter note. ♪ means eighth note. ♬ means sixteenth note and less than sixteenth note.

Table l-2b The percentage of the duration of 3rd note in Pattern C

	60's	70's	80's	90's
♩	67%	36%	22%	26%
♪	33%	48%	67%	64%
♬	0	16%	11%	10%

In the 60's, sixteenth note wasn't treated. It means that basic beat was quarter note in the 60's. In other decades, basic beat was eighth note. After the 70's text was sang faster than old songs.

Table 1-3 The relationship between 3rd note and 4th note in Pattern C

	70's	80's	90's	Total
3rd note >4th note	0	0	0	0
3rd note = 4th note	14	4	5	23
3rd note <4th note	4	11	15	30
total	18	15	20	53

Table 1 -3b The relationship between 3rd note and 4th note in Pattern C (Percentage)

	70's	80's	90's
3rd note > 4th note	0%	0%	0%
3rd note = 4th note	78%	27%	25%
3rd note < 4th note	22%	73%	75%

Table 1-3b shows that the 70's is different than other decades. Pattern C has congruent points between metric accent and the closure points of 3+ α mora patterns. The closure points of 3rd note <4th note is stronger than the closure points of 3rd note = 4th note. In other words, the relationship between text and rhythm was incongruent in the 80's and the 90's. The following are typical rhythm patterns that appeared in the past four decades.

The 60's: The relationship between text and rhythm in the 60's looks like WARABE-UTA. Pattern A is the most frequent (61%). The rhythm patterns within the ordinary rules of Japanese poetry (Pattern A + Pattern B) are 83%, only 17%. Pattern C, variations from out of the ordinary rules of Japanese poetry is 17%. And base beat duration is longer than other decades.

The 70's: The percentage of three patterns began to change. Pattern C increase to 42%. And the biggest characteristics is "Sing like talking" style. The continuation of same duration notes is sang like talking. In Table 1 -3, the amounts of 3rd note = 4th note (78%) larger than 3rd note <4th note (22%).

The 80's: In Table 1-l, this decades isn't vastly different from the 70's. Pattern C increases to 44%. However, in Table 1-2, the amounts of eighth note increases 67%. And in Table 1-3, 3rd note <4th note increases to 73%. This means that "Sing like talking" style is finished.

The 90's: Pattern C, variations from out of the ordinary rules of Japanese poetry, has increased (60%).

Analysis 2

The second step was a qualitative and quantitative analysis of weakened mora. I demonstrated what was caused by weakened mora, especially in the Pattern C. It was found that the syncopated pattern originated from weakened mora. And I analyzed the frequency of the appearance of the syncopated pattern in Japanese pop songs.

Findings

Table 2 The syncopated pattern originated from weakened mora

	60's	70's	80's	90's	Total
The Syncopated Pattern	8	18	29	62	117
Total	334	890	1123	1083	3430

The results are 8 (1 %) in the 60's, 18 (2 %) in the 70's, 29 (3 %) in the 80's, 62 (6 %) in the 90's [p<. 0001]. The syncopated pattern originated from weakened mora increased.

Discussion

Throughout this study, two things were found. One of them was typical rhythm patterns appear in the past four decades. And the other was that two tendencies have increased in Japanese pop songs. Two tendencies are the following: 1) Congruent points between metric accent and the closure points of 3+ α mora patterns; 2) The syncopated pattern originated from weakened mora. These findings mean that the relationship between text and rhythm in Japanese pop songs has become more complicated.

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Accessing the Child's View: A Study of a Five-year-old's Descriptions and Explanations of Invented Notations

Margaret S. Barrett

Abstract

In this paper the musical/notational discourse of a pre-literate musically naive five-year-old kindergarten child is examined in conjunction with his verbal discourse, in order to probe the child's understanding of the music/notation experience.

Introduction

The study of children's capacity to represent aspects of their world in symbolic form has been the focus of a considerable body of research. Generally, it is agreed that the notations children develop to symbolise their experience of the world is representative of their thinking about that world, although scholars differ in the interpretation of the symbols children develop, and the identification of factors that may influence that thinking (Gardner & Wolf, 1983; Karmiloff-Smith, 1992; Vygotsky, 1978). Much of this study has focused on the investigation of children's notations in language and visual arts, with researchers viewing these notations as expressions of children's thoughts and feelings, and indicators of their cognitive development in these domains. By contrast, the study of children's invented notations of musical experience is a relatively recent phenomenon. Research in this area reflects the concerns of researchers in children's symbolic development generally, with a number of researchers suggesting that children's invented notations be viewed as indicators of musical thinking, and representations of musical knowledge (Adachi & Bradshaw, 1995; Bamberger, 1982, 1991, 1994; Barrett, 1997; Borstad 1989; Christensen, 1992; Cohen 1985; Davidson & Colley, 1987; Davidson & Scripp, 1988, 1989, 1992; Davidson, Scripp and Welsh, 1988; Gromko, 1994; 1998; Gromko & Poorman, 1998; Smith, Cuddy & Upitis, 1994; Upitis, 1987, 1987A, 1987B, 1990, 1990A, 1992).

In studies of children's invented notations, notations have been generated through tasks including notating: familiar and unfamiliar songs; researcher-generated rhythmic and/or melodic patterns; and original instrumental and vocal compositions. Studies have examined the notations of children aged 2 years (Gromko, 1998) through to those of musically trained and musically naive adolescents and adults (Smith, Cuddy, and Upitis, 1994). A number of studies have suggested developmental trajectories of children's musical understanding as it is evidenced in the notational strategies they employ (Bamberger, 1982, 1991, 1994; Davidson & Scripp, 1988; Gromko, 1994; Gromko & Poorman, 1998; Upitis 1992) and indicated typologies of notational strategies. Generally, studies have shown that with musical experience and over time, children's invented notations become more detailed, and reflective of an increasing range of musical dimensions, with symbol choices moving from enactive and representational depiction ('playing out' the rhythmic pattern on paper, sketching the instrument, drawing pictographs of lyric content) to more abstract depictions of musical elements. A common finding of many studies is that children draw on a broad range of notational strategies including the use of symbols borrowed from other domains (letters, words, numbers, directional signs), conventional music symbols, icons, pictographs, and invented signs. Recent studies have suggested that the notational strategies children employ are influenced by the nature of the task (Barrett, 1998) and that children's capacity to encode and decode musical experience is related to their aural perception of sound (Gromko & Poorman, 1998).

The focus of many of the above studies has been the examination of children's notations in isolation from their verbal accounts of these notations. Few studies have attempted to access children's verbal descriptions and explanations of their notations in conjunction with the analysis of these products. Where this has occurred (Bamberger, 1991; Christensen, (1992); Davidson & Scripp, 1992) the analysis of the child's commentary on the notation has illuminated our understanding of the musical thinking that has generated that notation.

However, those studies that have examined children's verbal accounts of their notations have tended to focus on the work of school-aged children who have some history of music instruction (Bamberger, 1991; Christensen, (1992); Davidson & Scripp, 1992; Upitis, 1993; 1992), or have focused on the children's descriptions and explanations of their notations of known songs (Davidson & Scripp's 1992), rather than their descriptions and explanations of notations of a range of musical experience (eg. original instrumental compositions). The examination of pre-literate and musically naive kindergarten children's proffered descriptions and explanations of invented notations has received less attention. As adults we tend to infer meaning from the notational and musical products of young children in isolation from the child's own account of these products, ignoring in this process the meanings that children themselves ascribe to their notations and musical products. A danger in viewing the child's work from an adult 'expert' viewpoint is a tendency to focus on 'deficiencies' rather than the knowledge that the child brings to the task (Davidson, 1994). An aim of this research project was to investigate children's verbal accounts of their notations in an attempt to probe the knowledge they bring to the task.

Method

The study reported in this paper is a component of a larger investigation into the nature of children's invented notations as they are developed in response to a range of tasks. The research protocol was designed to examine the notational strategies employed by pre-literate, musically naive kindergarten children (aged 4.3 years to 5.2 years) when notating invented song, canonic song and original instrumental compositions, and, to probe the children's thinking about the function and meaning of these notations. The study involved 24 kindergarten children (twelve boys/twelve girls) enrolled in a whole day kindergarten program (two full days per week 9am - 2pm) in a large semi-rural school.

Design and Procedure

Data were collected over a two month period in the final term of a three term school year. As the 'primary instrument of data collection' (Lincoln & Guba, 1985), I visited the site weekly in order to work individually with children within the kindergarten area of the school. Participation in the study was voluntary and children chose to work with me as one of a number of options available to them in the daily kindergarten program. This naturalistic design was adopted in order to avoid adverse affects on participant's responses due to perceived unfamiliar or artificial conditions (Casey, 1992). During the sessions with the researcher children were asked to: sing a familiar song; sing an original song; and, make up a piece of music for any of the available instruments. On completing each of these tasks children were asked to 'find a way of writing down the sounds of the song (or piece of music) so that you can remember it and some-one else could work out how to play/sing it if you weren't here'. On completion of the notations the researcher discussed the notation with each child. Each of the sessions was recorded on audio cassette, and notations and observational data were collected.

Notational Data

Due to the voluntary nature of the study, the number of notations and interactions collected from children in the kindergarten varied. Three children chose not to participate in the study, and/or were absent from school on the data collection days. Of the remaining 21 children, the most prolific composer-notator produced a total of 17 notations, whilst seven children produced only one notation. A total of 78 notations were collected. The distribution of these notations across a range of categories has been described elsewhere (Barrett, 1998).

Observational and Verbal Data

In attempting to access the child's view of the function and meaning of the notations, the researcher engaged in conversation, or 'talk-in-interaction' (Holstein and Gubrium, 1994) with each child on completion of the notational task. Through these 'talk-in-interaction' events, the researcher attempted to elicit children's descriptions and explanations of the symbols that had been developed, and to probe their musical thinking. Each of the sessions was recorded on audio-tape, and observational data were collected throughout the sessions.

Accessing the Child's View

Max had just turned five at the commencement of the study and had no formal musical training (studio instrumental tuition) or experience beyond that offered in the kindergarten program (singing activity). Max produced 17 notations over five separate sessions with the researcher. The sections of transcript examined in this paper have been selected to illustrate a range of Max' notational strategies and his descriptions and explanations of these strategies.

In conversations 1 and 2 Max indicates that variation in the size of a symbol (sketches of the instruments, temple bells and tambour respectively) records the musical dimensions of instrumentation and dynamics, a strategy from which he is able to retrieve his meaning effectively and efficiently.

Conversation 1

R	So can you tell me what this notation meant?
Max	(Max plays the composition)
R	A-ha,...so what's the difference between this one, this first one at the top of the page and the other ones on the page (researcher points to symbols in Fig. 1)?
Max	Well...let me think of it, well, um, see well, this one isn't as big as that one is it...
R	...No...
Max	...so that's the biggest...
R	...Right...
Max	...so that's um well middle sized...
R	...Ok...
Max	So I do one of loud tap because that's big, and I do a middle sized tap, that's the smallest so I do a tiny little tap, that's well probably so that's about smallest mid sized so I do that sized thing and that's a medium sized one like those so I play um a sort of small big chime and they're just middle sized ones so I just go chime, chime.

Conversation 2

R	A-ha, so tell me about that one, that notation for the drum.
Max	...um well it's a big one
R	Mm so, like that one there, (researcher points to notation - Fig. 2) that's the big one?
Max	You see, it's sort of, it's just the same as that (points to notation for temple bells), the big one goes down in that low shelf and its been biggest, little smaller, smaller, smaller, smallest (Max points to successive features of the notation as he talks, reading the notation from the bottom of the page upwards.)

Working some three weeks later, Max draws on a different strategy entirely. In this conversation Max' attention seems to be focused on the timbre of the two sounds produced on the guiro, and the exact representation of the patterning of these sounds.

Conversation 3

Max	(Max is speaking to himself whilst alternately notating and playing the instrument)....weeeee.....scratch...scratch, scratch, scratch, scratch, scratch, scratch boom, boom, boom, boom, scratch, scratch, scratch, boom, boom, boom, boom, scratch, scratch, boom, boom, boom, boom, scra-atch, scra-atch, scra-atch, scratch
R	Ok
Max	(speaks through and points to the notation - Figure 3) It sounds like scratch, scratch, scratch, scratch, boom, boom, boom, boom, scratch, scratch, scratch, boom, boom, boom, boom, scratch, scratch, boom, boom, boom, boom, boom, boom, boom, scratch, scratch, scratch, scratch
R	Ok, if I hold it for you, do you reckon you could play it?
Max	(plays on guiro, with exact correspondence between sound and sign).

The use of onomatopoeia is an important component of Max' notational processes, a strategy that he draws on for the following extended experimentation, composition, and notation task completed in the same session.

Conversation 4

Max Well, them sort of make scratch, scratch, scratch too, but in, in a different way of scratching
R Is it?
Max It's a sort of a chimey scratch
R A what sort of scratch Max?
Max Chimey
R A chimey scratch
Max yes (plays cabasa)
R Can you get any other sound out of it apart from the scratch sound, the chimey scratch?
Max (shakes cabasa)

Max continues to experiment with the 'chimey' scratch (conventional sound production) and sounds produced by shaking the cabasa and hitting the instrument into his hand. The conversation continues:

Max There, it's a m, m, m
R Hmmmm
Max Can I show you.
R Ok
Max When I hit it on my hand...m, m (indistinct, plays instrument)
R So it's a m sound is it?
Max Yes, well it makes a sound a little bit like a m sound, but it (indistinct)

After further experimentation Max proceeds to notate, then turns to the researcher:

Max ...this well, I can see this (plays cabasa long spin) Well, could call it the spinny because it...spins
R Does spin a bit doesn't it?
Max Well, scratch scratch.....spin, spin, spin,...and spin, and... spin. There. Spin, spin, spin, spin, spin.
R A-ha, so, what does that whole thing sound like? Where do you start?
Max (speaks through and points to notation) m, m, m, m, m, m, m, spin, spin, spin, spin, spin.

Through this episode, Max draws on a range of recording strategies (Fig. 4). As in the previous notation, Max uses onomatopoeia to label the characteristic sounds of the instrument (m, m,) and draws on the written language convention to record this dimension. Max also develops a symbol to represent the 'spin' sound produced on the cabasa, a circular shape. This symbol appears to arise from the process of 'playing out' the action of the 'spin' sound on the page, and may be described as enactive. Max is also concerned with providing correspondence between sound and symbol, although this is only accurately achieved in the 'spin' section of the composition.

In the final conversation Max describes his notation of the song 'Hey diddle, diddle' (Fig. 5).

Conversation 5

R That's a really interesting notation that you've got there
Max The cat in the fiddle, and that thing there is the cow jumping over the moon,
R right
Max ...and there's the little doggy laughing, and that's the, that's the um plate and that's the spoon
R How will I know when to make my voice go up and down (researcher varies pitch on up and down to illustrate concept)?
Max ....well, you know...(long pause) I'll tell you (sings the song)
R ...so where do I go down?
Max (points to second group of pictures in notation)

In this notation Max records the significant features of the text of the song using pictures. In his description and discussion of this notation Max' attention appears to be focused on the lyric content of the song. However, the arrangement of the pictures on the page follows the two phrase structure of the song, with the pictures associated with the first phrase positioned on the page in ascending order, and those of the second, descending phrase, positioned in the lower left corner. In indicating the descending phrase of the song, Max points to the second grouping of pictures, suggesting that this positioning is not accidental.

Concluding Remarks

In notating their musical experience young children draw on a range of notational strategies. The choice of strategy employed in specific contexts appears to be influenced by a range of factors. These include the choice of instruments and sounds generated, and the tasks from which the notations arise. From an analysis of the above transcriptions, it is also evident that a focus on one musical dimension (eg musical timbre) may be notated in a range of ways.

When recording original instrumental works, Max' immediate focus appears to be the musical properties of dynamics or timbre, evidenced in his focus on these in his description of the notations of these works. It could be speculated that the instruments selected by Max for these tasks prompted that focus. For example, both the guiro and cabasa provide timbral interest whereas temple bells and tambour are more responsive to performance at different dynamic levels. It is interesting to note that when describing the notations in which timbre is a focus, Max uses onomatopoeia or vocalises the sound, whereas when describing notations in which dynamics is a focus, Max does not 'characterise' the sound. Max' reliance on onomatopoeia and vocalisations in recording timbre, is notated not only through the use of letter names (m) but also through the development of abstract symbols (see figure 3). By contrast, when notating songs, the content of the lyrics appears to dominate Max' thinking with little immediate evidence in the notation itself of reference to musical dimensions.

Whilst the notations and conversations described here suggest that Max' focus in notating his instrumental and vocal compositions varies between recording musical features such as the dynamics or timbre, or the lyric content of the song, a consistent aspect of each of these notations is a concern with structure. In all instrumental composition notations, there is a strong sound-to-symbol correspondence depicting the patterning of sounds. This becomes evident when Max simultaneously speaks through these notations, and points to the sequence of sounds. In Max' notation of 'Hey diddle diddle', although the symbols generated are pictorial, the arrangement of these on the page, and Max' identification of the beginning of the descending phrase on the notation suggest an awareness of the underlying phrase structure of the song, and a reference to the melodic contour of these phrases.

Through the talk-in interaction episodes, the researcher was able to probe beyond the two-dimensional representation of Max' musical thinking as it was recorded on paper and to access some of the 'network of organising constraints' (Bamberger, 1991) Max was using to record his musical experience. In school settings it is difficult to devote this time to individual children in order to move beyond an analysis of a single representation of musical thinking. However, if we are to understand more of children's constructions of musical meaning, greater attention needs to be paid to the child's voice in musical experience, and opportunity provided to generate 'multiple representations' of thinking (Eisner, 1994).

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FIGURE 1

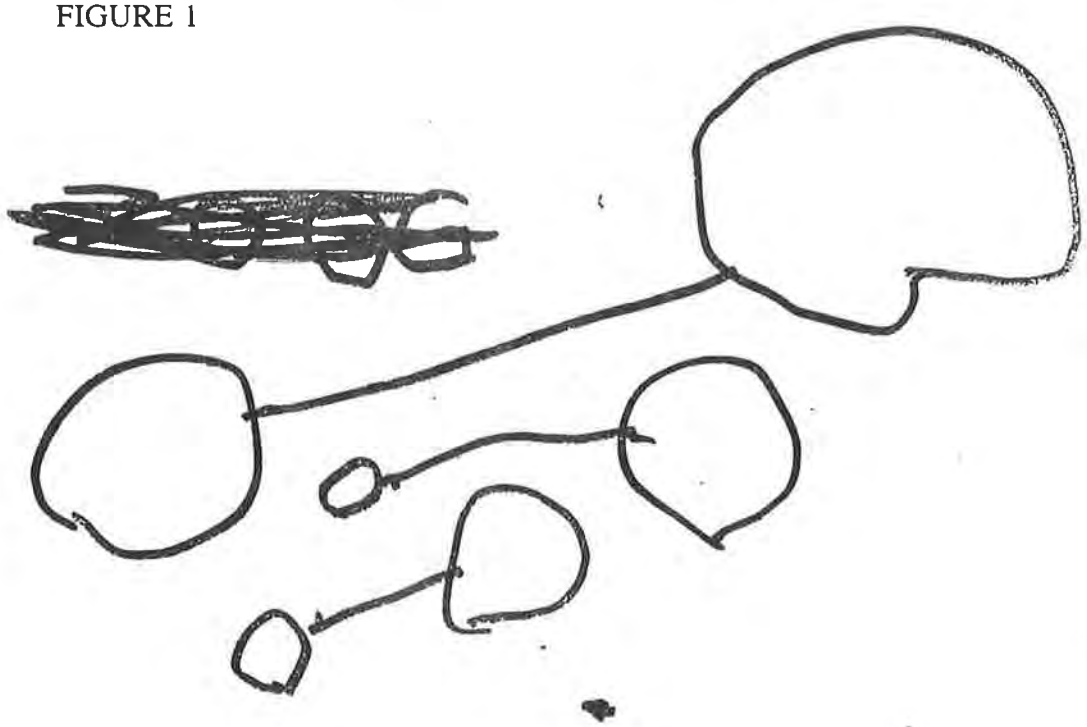


FIGURE 2

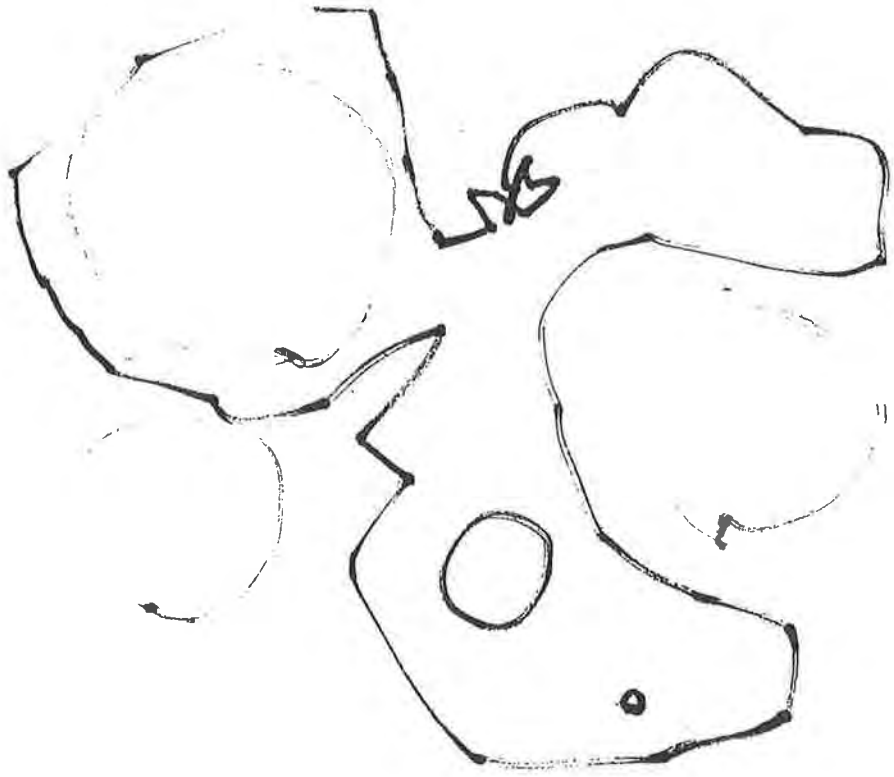
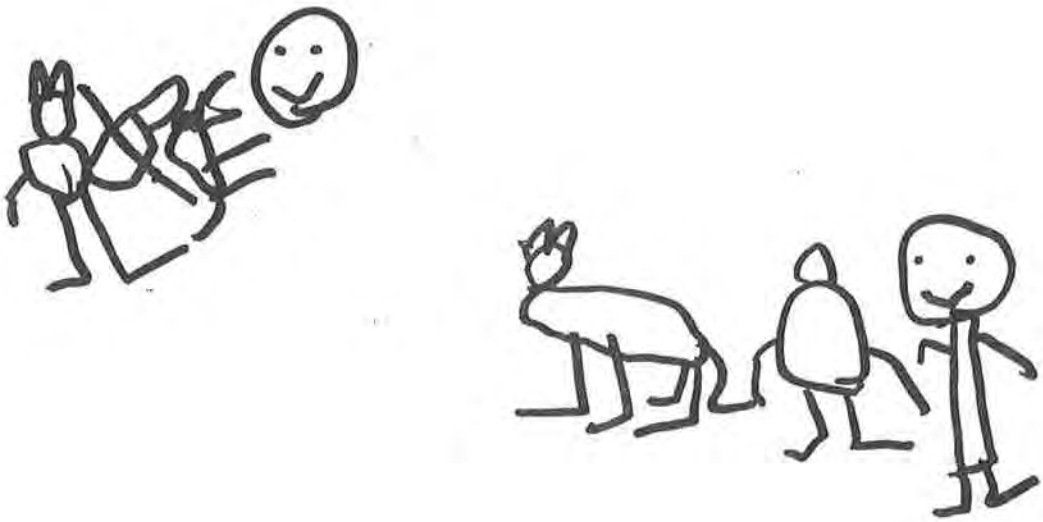


FIGURE 3

FIGURE 4

FIGURE 5



The Construction of the Musical Memory in the Subject: A Study of the Cognitive Processes

Esther Beyer

Abstract

This paper addresses the research question How does the musical memory work, according to a constructivist theory?

Introduction

In the last years, the number of studies about memory processing have increased. A lot of researchers (Barbarcci, 1965; Gardner, 1994; Eysenck & Keane, 1994; Kosslyn, 1992) agrees that the exercise of any profession demands the memory of articulate groups of actions. In the area of music, remembering sounds constitutes one of the most necessary tasks to perform musical activities and to understand the musical language. The memory is directly related to the mental image, or aural image, when we speak about sounds. So, our research problem was: How does the musical memory work, according to a constructivist theory?

Barbarcci (1965) mentions seven types of musical memory: muscular and tactile, auditory, visual, nominal, rhythmic, analytic and emotional. Gardner (1994), speaks about the visual and the verbal memory, besides the musical memory. Eysenck & Keane (1994), like several modern authors, speak about memory of short and of long term. Kosslyn (1992) approaches the subject of the capacity to work with images, where the memory of the object will be transformed.

In the area of the music, we have a great number of researches, investigating different types and modalities of memory. These include Dowling (1994), Sloboda (1985) and Deutsch (1982). In Brazil, an important study was made by Costa (1995). Although we have an amount of researchers in the area, we hardly found researchers that concentrated on trace parallels or applications of the cognitive theory of Piaget to the musical memory.

The Case-study

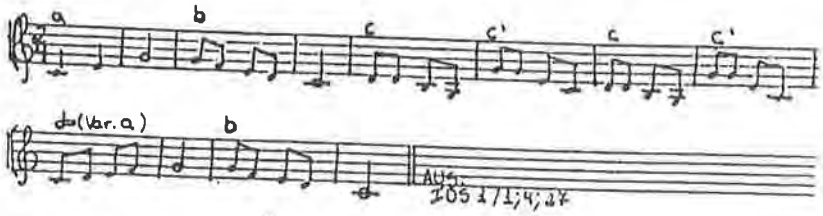
We adopted for our work the methodology of a case study with a child that we studied from birth until 3 years old. The selected child was my son, once I would have him 24 hours a day, and I could observe his musical development on a continuous way. We collected data in written protocols and in audio cassette's. We had an immense amount of material to be analyzed. Some of these data were already analyzed in other works (Beyer, 1994a, 1994b, 1994c, 1995a, 1995b, 1996). On this study, we will detail more specifically just the attempts of the child to sing a well-known German child song (Hopp - Hopp - Hopp), at age one.

Results and Discussion

Referring to the results, I will expose how was the sequence of the gradative acquisitions of this song. Although the development happened in a continuous way, I separated the description in moments, only for didactic reasons.

In a first moment, the mother sang the melody for the child in different opportunities along the days (See transcription Nr. 1). Until 1;4, that is, one year and four months, the child just limits to accompany the contour of the melody simultaneously to the mother's song. In this case they are just ascending and descending glissandi, according to the melodic line of the song. The process of mental representation of the song is beginning.

Transcription No. 1. Hopp - Hopp - Hopp.



With 1;4;27 he tries to sing the beginning (a) alone for the first time. To do this, he makes countless attempts along the whole day, just singing these first three notes, without respecting the relationship of time among them, singing the notes with oscillations, as if they were three long notes. For each note, the child makes new breathing.

Some days later, he tries also to sing the motive (b). To reproduce it, he sings the descending line of this motive in glissando. This strategy was already used previously when he sang simultaneously to the model. Thus, he sings a glissando much larger than the interval ambits of the motive: instead of a descending glissando of a perfect fifth, sometimes he sings until an octave. If on one side we have a progress in the capacity of melodic memory, for another it seems that there is a setback with relationship to the first motive (a), that is now shown with a larger oscillation when singing the pitches.

We can see that the acquisition of the parts of this melody is not automatic, but needs a lot of moments of action and interaction with the musical object. When acquiring longer structures, it seems that the new perspective of (a) leads to a temporary instability of the parts, until that structure reaches a new stability in a wider dimension. Obviously the second motive is more difficult, considering the number of notes, the rhythmic outline - the motive demands more speed and also only one breathing , the change of ascendant to descendent direction.

This leads the child to sing countless repetitions of the same part, until he finds a solution that seems to be similar to the melody represented in his mind. This solution seems to be found one day later, when the child tries to sing (b) in approximate descending steps. But then he loses the rhythm of the song: each note is sung separately, according to the pattern of long notes of the motive (a). It seems that this solution does not correspond exactly with the aural image that the child possesses on the melody. For this reason, he performs the motive some times with glissando, other times with defined degrees, interpolating both forms.

The song really seems to occupy the child a lot on these days, so that we registered that approximately with 1;5, he made the attempt to sing the motive c and c'. In fact, this motive presents a larger complexity for this child, once the child doesn't still possess a cognitive-musical schemes to represent and to execute this part with larger precision. Thus, he sings a very long note D, trying with this to substitute the whole motive.

The dynamics of always trying new solutions to sing that melody alone continued for several days and months, followed by several stabilities and instabilities. Referring to the motive (b), starting by the age of 1;5;7, he made one attempt to sing several descending pitches more quickly. However, the intention overcomes the precision, and the descending line exceeds in far the limit of the final C of the motive. He realizes therefore that are very few pitches sung until the moment and that he needs to increase its number.

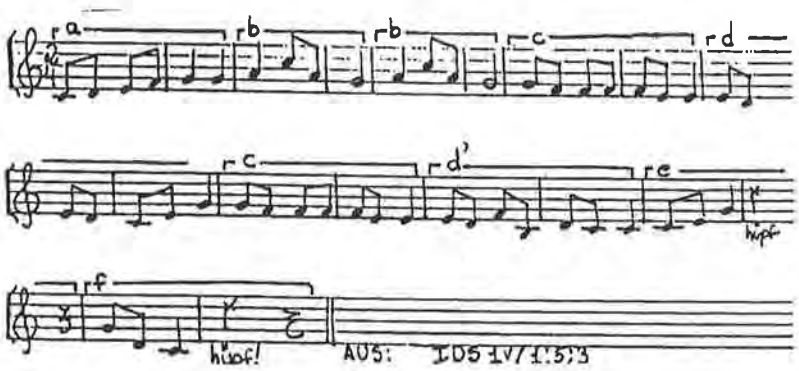
With 1;5;11 we observed that he interpolated three different strategies for the acquisition of the motive c and c'. The first consists of beginning always again a-b-a-b, leaving c out. Such an attempt seems to be a simple useless repetition of the beginning of the melody. But, when we observe more accurately this attempt, we began to understand the performance in another way: the first a-b corresponds possibly to the beginning of the song and the second, possibly to the end of the song, that seems more accessible to him with the schemes already acquired.

The second attempt consists of singing rapidly a great amount of notes in "tá-tá", according to aleatory pitches, like a rhythmic conversation without sense. The boy demonstrates here that knows other information regarding to the part that he tries to sing: "this is a fast one, and it has many notes, although I don't know how to find them with precision."

The third attempt of reproducing c and c' leads the child to sing a large sequence of long notes. We can see that the schemes acquired to sing a is here again being implemented, only with different pitches. This attempt demonstrates that the child knows that the part c-c'-c-c' is a vast part in the song and that perhaps could be filled with the scheme already well-known of a.

The acquisition of the motive d - registered with the age of 1;5;15 - is easier, possibly for the similarity that this part presented with the beginning of the melody "Häschen in der Grube" (Transcr. NR. 2). The difference between the motive d and the beginning of the song is just at the end of them: the first one has only one long note, and the second one, two one-unit-notes. We can see again, that the cognitive-musical schema already acquired for a song or a part of this can be more easily implemented in other part or song, although this schema needs to be changed several times.

Transcription No. 2. Häschen in der Grube



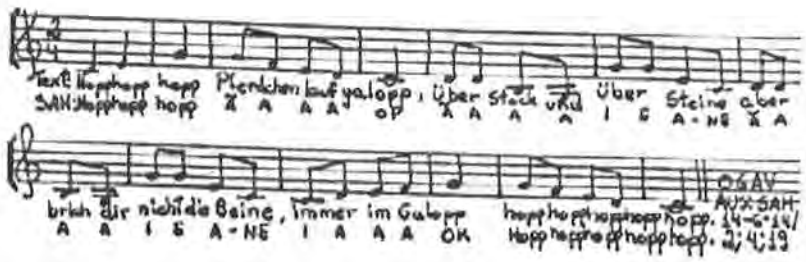
Until this time the child had not demonstrated a coordination among the parts of the melody, where many performances had several tonal centers, one for each motive. Now, after 1;5;20, we observed the beginning of one tonal center between two motives, that leads to the coordination. It seems in fact that the child is concerned with the coordination of motives, because we noticed also a type of "compact" song of the major triad , very common on this song (See transcription NR. 3).

Transcription No. 3.

Only with the age of 1;6;15 he began to have a tonic to the whole melody. Such acquisition is not generalized, it is just specific for this song. Thus, the boy, sings the whole melody - by his way - extending the approach for all the motives, not just for two. Such fact doesn't mean that the child has already reached a sense of tonality, it just means that at concrete level of action this tonality schema exists on this song.

The melody continued to be a challenge for the child for a long time, winning gradually larger precision on rhythm, pitch and a slow acquisition of the text of the song. I present, just as a curiosity, the same melody being sung with 2;4;19 (see transcription Nr. 4), almost one year after the first attempts of singing the song alone. This transcription demonstrates its concern now to acquire the text of the song, while the question of melody and rhythm is almost solved.

Transcription No. 4 .



Conclusion

Observing the process, we found that the child grew up building its musical memory step by step, depending fundamentally of his musical opportunities to construct aural images. According to the theory of Piaget (1982; Kesselring, 1993; Dolle, 1983), the fundamental processes to the construction of these images are the assimilation and the accommodation. The first process is already in charge of the appropriation of the object with the outlines existent in the subject, the second consists of the process of adapting, to change the outline or knowledge already existent to the new situation.

In other words, we see that the child initially built an outline for the motive a, later he tries to apply it in the motive b, c and c' and d, once he was in assimilation process. When noticing that this existent outline doesn't capture the essence of the new musical structure, he modifies the pitch, direction of the sounds or rhythms, so that he reaches the object he intends to capture, adapting to its characteristics. Once modified the schema, this doesn't stay static, but it modifies itself again in new assimilations and accommodations, until the object is satisfactorily known by the subject.

The child's playing with the object allows the gradative assimilation of this, once there are several attempts - among the repertoire of well-known actions for the subject - to approaching this. It is this playing that will allow the gradative acquisition of the meaning, when the symbolic function begins in the child. On the other hand, the imitation allows the accommodation of the mental structures of the subject to the characteristics of the object,

generating the construction of the significant in the pre-operative child. If this study proves to be true, then music educators should offer more musical activities involving cognitive processes. Teachers should also respect the cognitive process of each student.

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From the Personal to the Professional: Teachers' Own Experiences of Music and how they Influence their Classroom Practices

Sally Bodkin

Abstract

This paper examines the musical identity of the teachers. It raises the following questions: How do they feel about teaching music in an Early Childhood environment? Do they see themselves as musical? How have negative feelings about music been overcome?

Introduction

Tena koe, hello to one
Tena korua, hello to two
Tena koutou, hello to all
Haere mai everyone
Welcome everyone.

I have begun this paper with a song of welcome. This is one of the many songs I have encountered in my fieldwork in different early childhood centres throughout New Zealand. I am nearly two years into a PhD in Early Childhood music in Aotearoa, looking at music and identity. Fieldwork is being conducted in three types of Early Childhood Education: kindergartens, childcare centres, and Kohanga Reo (Maori language immersion group) and A'oga Amata (Samoan language group).

The specific focus of my research is identity. This paper examines the musical identity of the teachers. It raises the following questions: How do they feel about teaching music in an Early Childhood environment? Do they see themselves as musical? How have negative feelings about music been overcome? Connie Foss More, a Canadian Early Childhood music specialist, suggests:

> If we train teachers of young children, it is essential that they experience some of the freedom and joy in music-making that their young students will later feel' (More, 1990, p. 108).

Therefore teachers need to be passing on their own enjoyment to the children. So how do teachers feel about music? Here are some of the comments gathered so far.

> When it is actually your turn, I think that night, 'Oh my god what am I going to do tomorrow?'
>
> I hated it [teaching music], avoided it like the plague.
>
> When you're out there doing music you're making an idiot of yourself, whichever way you look at it.
>
> I don't have positive feelings towards music and taking music, I'm not very confident.
>
> In most kindergartens I team taught music because I never felt confident doing it on my own and if it came [time] to do it on my own I would always find an excuse not to do it.
>
> [I] hate the feeling of having to do it. I want to do it because the children are ready for a music session.

Comments like these reveal that for some teachers music is something that is feared and avoided if possible. They do not feel confident about their own skills and their ability to take music sessions.

Robert Walker has suggested that the enormous edifice of Western musical theory and practice is a cultural artifact, a product of a learned belief system (Walker, 1990). While he applies this in relation to musical theory and performance, it can be extended to include what shapes ideas about musicality. I believe there is a learned belief system in the cultures that these teachers are members of, which labels specific individuals 'musical' or 'non-musical'. Labels such as these become ingrained in an individual's identity. All of these teachers had experiences in their past which contributed to or created a sense of musical inadequacy as part of their identity. For some it is experiences at school, those associated with instrumental performance.

> We had to play an instrument. . . and I found it really hard to read the music and it was just really scary, because they'd come and have a go at you if you hadn't practiced the music.

Public humiliation, especially being told that you can't sing in tune can have a huge impact.

> I went to a girl's school where they did a production and all the classes got up and had to sing. . . and I was asked to mouth the words a couple of times by the teacher so I've always felt I can't sing, so I won't. That has definitely affected the way I feel about singing, definitely. I always remember her saying 'A, would you mind mouthing the words,' in front of the whole class.

Where the focus is on individual performance, feelings of incompetence are not uncommon. This comment is from a teacher who was put off music during her Early Childhood training.

> Well, I failed, I couldn't play the piano, I can play a little, but not enough to pass the course. [I] tried to learn the guitar in time, and I didn't have any time and couldn't do that either. . . not enough to pass, and they said well you'll have to sing, and of course I couldn't sing either and they said, 'you're out of tune, you'll just fail.'

The labelling of individuals as musical and non-musical is both internal and external. It can be external by music educators. Mary Renck Jalongo, a teacher of undergraduate and graduate courses in Early Childhood Education, has twice published articles in the journal *Young Children* (1985, 1996) which use the label 'non-musical'. "Using recorded music with young children: a guide for non-musicians". and "Singing with children! Folk music for non-musicians". The opening paragraph of the second article begins by defining a non-musician in a very negative way, as a series of 'can'ts' and 'don'ts' (Jalongo, 1996, p. 6). While the basic argument of her writing is a positive one: that it is not necessary to have formal performance skills in music to have a successful music programme at the Early Childhood level, I still find the tone set at the outset to be a damaging one. She is reinforcing the image of the non-musician. Who is she to say that there is such a thing anyway? I would dispute that there is such a thing.

Ethnomusicologist John Blacking addresses many of these issues, particularly those equating musical performance with musicality. He states, "Children are judged to be musical or non-musical on the basis of their ability to perform music" (Blacking, 1973, p. 9). Blacking focuses on music as a form of communication. Musicality and being musical is being able to understand and respond to this humanly organised sound. Jalongo's article titles exemplify what Blacking is challenging nearly 25 years earlier. You are musical if you learned to read music or play an instrument, if you did not, then you are non-musical.

I define 'musical' in terms of Blacking's work. You are musical if you enjoy and can respond to music, if you can understand and relate to the messages it is expressing. Therefore no-one is 'non-musical'. The label of 'non-musical' can also be applied externally by other

colleagues of an individual. In some centres one particular member of staff will get a reputation and be labelled the 'musical' one. The other members of the staff tend to regard this person as the one who is responsible for music and musical resources.

> Have you talked to B?. . . B's really into music, a lot more than I am.

The irony is that often these people do not see themselves as musical, they have achieved the label of 'musical' by default and would most likely refute it themselves.

> [It's] funny considering I can't read music and I don't play an instrument.

One teacher felt that there needed to be a staff member who was really into music, for whom 'music is their thing'. Then the musical staff member gets all the others into it.

As well as external labelling there is internal labelling by the individual teachers themselves. All of those whose comments are mentioned above would without hesitation consider themselves non-musical. Musicality is equated with instrumental and vocal performance skills. However, even teachers who have had some formal training on an instrument can view themselves as non-musical, or are disparaging about their musical skills. For some it is a lack of confidence.

> I actually learnt to play the ukulele at school and I used to enjoy playing that. I'd been relieving at kindergartens before I went to College, and I used to do music, but I still didn't really feel [confident], it's just a barrier that I've built up. . . I'm aware that music's not one of my strong things . . . I'm not really musical or anything like that.

Others are quick to play down their own abilities.

> I used to try and play the guitar but I wasn't any good at it.

> I learnt the piano for eleven years. . . but because I don't have a piano at home I don't practice and therefore I'm no good.

And another teacher commented that when she sang children to sleep they would go to sleep quickly so they didn't have to listen to her singing.

Some of the teachers feel it necessary to apologise to me for what they see as their own inadequacies, as though I am a music policewoman.

> Teacher: I played the guitar.
> Me: Do you still do that?
> Teacher: No, naughty!

So how have teachers overcome these feelings of inadequacy? How are they able to contribute to a music programme? One method is to turn a weakness into a strength. Teachers who feel musically incompetent deliberately focus on music in order to overcome the negative feelings. Rather than ignoring what they perceive as a problem, they confront it. Others avoid situations which place them in an uncomfortable position. One teacher, for example, avoids taking music in a situation where other adults might appear, or if they do come in she allows them to take over the leading role in whatever musical activities are happening.

Music occurring in a spontaneous and informal manner is also somewhat liberating for teachers who have feelings of musical inadequacy. One teacher felt more comfortable making music outside as a result of the children's spontaneous play rather than contributing to organised music sessions. This might have been due to the less formal atmosphere of the outside environment, or because the children tended to gather and organise themselves, unlike the inside sessions which were instigated by a teacher.

Having a number of resources for different songs can also be a factor in increasing a teacher's confidence in music. Props such as puppets and charts mean that an individual does not have to be self-reliant. They supply concrete and tangible support for musical activities.

Team teaching music can also make an individual feel less threatened. Perhaps this is because it creates a sense of a group musical experience rather than one teacher directing or leading a musical performance. Working in pairs also means that there is another person to fall back on, or step in if one teacher loses their confidence.

Ongoing training in the form of professional development courses on music can also act as a confidence building force for some teachers. The skills and information they gain from an in-depth course on music can increase their positive feelings towards music. Courses appear to be most effective when more than one member of a staff attends. However teachers who feel musically inadequate might not be able to increase their musical knowledge and confidence through attending courses because they are afraid of situations they might be placed in at the course. They fear that their lack of musical ability might be publicly recognised. It can also limit how involved they allow themselves to be at the course.

To summarise:

1. Many teachers struggle with feelings of musical inadequacy.
2. Individuals who have had a bad experience with music earlier in their lives can carry a lasting feeling of musical incompetence. Being told they cannot sing in particular can do much damage to musical confidence. They develop an non-musical identity.
3. In centres with a small group of staff, one particular member is often labelled 'musical', sometimes this title is given by default and the person so named does not actually see themselves as being especially musically able.
4. Music is perceived as a highly specialised subject area, and a teacher needs a high level of formal training to be 'musical'.
5. It is appears that some training in an instrument serves to make individuals feel less musically capable and more musically inadequate.

However the picture is not all negative. Teachers have found ways to overcome their fear of taking music. These include:

1. directly confronting their feelings of inadequacy and focusing on improving their approach to music,
2. taking music in pairs rather than as an individual, or using a variety of resources such as puppets to support their musical activities,
3. increasing their own confidence in music by instigating songs in a less formal and more spontaneous situation,
4. building up their skills through in service training and courses which focus on music.

I would like to leave you with the words of one teacher I have interviewed:

> I actually think you don't have to be a genius. You've got to do things simply and feel good and have fun and share and really that's all.

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Singing Self-Efficacy: The Critical Years

Jenny Boyack

Abstract

The myth of tone deafness is alive and well in New Zealand families and schools. Although vocal development research points to singing as a developmental skill rather than a fixed ability trait, school practices reflect that the opposite view is widely held. This research involves the survey of a year group of teacher education students about self-efficacy in singing and about the factors which have influenced their beliefs. Preliminary analysis of the data indicates that feedback about singing ability from family members, teachers and peers is the most significant factor in the development of beliefs about singing capability and that the years 8 - 12 are critical.

Introduction

As a teacher educator involved with music curriculum courses in the primary preservice programme at Massey University College of Education I have been concerned by the number of students who identify themselves as 'unmusical'. Because the New Zealand education system requires all regular classroom teachers at the primary level (years 1 - 8) to take responsibility for the provision of a classroom music programme the issue of student teachers perceiving themselves as 'unmusical' raises important questions for music educators involved in teacher education.

We need to ask:

1. how widespread among student teachers is the belief that they are unmusical?
2. what is the source of these beliefs?
3. what school (and other) practices may have contributed directly or indirectly to students' beliefs about their 'musicality'?
4. how can we assist teachers or student teachers who perceive themselves as unmusical to provide effective classroom music programmes?
5. what action can be taken to improve music education practices in primary schools in order to increase the likelihood of positive outcomes for children?

I believe that as music educators we are often guilty of justifying unsatisfactory musical outcomes by attributing failure to low ability or lack of effort. Such arguments do not take account of the complex set of factors which are at work through the critical developmental years nor do they reflect the importance of the social context of learning.

Tait and Haack (1984) espouse the value of reaching beyond musical concerns in order to gain a broader view of musical issues stating that "the musical problem is unlikely to be resolved unless the human problem is first attended to" (p.76). Socio-cognitive theory and in particular the construct of self-efficacy (Bandura, 1986, 1997), provides a useful theoretical framework through which to explore issues surrounding the concept of being 'musical' and how it develops in individuals.

Self-efficacy refers to the beliefs individuals hold about their capability to perform successfully or act effectively in specific areas of human functioning. Bandura (1977) cites four factors as being of central importance in the formation of efficacy beliefs. These are **performance accomplishments, vicarious experience, verbal persuasion** and **emotional arousal**. Unlike more general measures of self such as self-esteem or self-confidence, efficacy beliefs are domain-specific rather than global and are inextricably linked to specific skills. A large body of research about self-efficacy has demonstrated, among other things, that self-efficacy:

1. plays a vital mediating role between skill and action
2. influences skill acquisition both directly and indirectly

3. is a better predictor of positive attitudes than actual ability.

People with high self-efficacy in a particular area show resilience in the face of failure and are more likely to persevere in difficult or challenging situations than those with low self-efficacy (Bandura, 1977).

The research I have undertaken seeks to answer the question of how widespread the belief of being unmusical is among student teachers and to identify the source of such beliefs. The focus, though, is on singing rather than general musicianship. There are three reasons for this:

1. singing and the subject of vocal development and the acquisition of song is of particular academic and musical interest
2. singing as a specific musical activity frequently is associated with beliefs about being unmusical and is a common source of anxiety for unmusical students
3. singing is central to classroom and school music programmes. Very often it is the only musical activity children experience at school.

A questionnaire sought to establish student teachers' beliefs about their capability in singing. Four singing subskills - in-tune singing, singing with pleasant tone, rhythmic accuracy and singing with appropriate expression - were identified. For each of these, student teachers were asked to rate task difficulty and strength of belief as well as rate themselves on a general singing self-efficacy item. They were asked to comment on how their singing self-efficacy developed and on any particular experiences or events they could recall that contributed to these beliefs. Data on gender, age and ethnicity was also obtained.

Preliminary analysis of the results indicates that a large number of student teachers have low self-efficacy with regard to singing. In-tune singing seems to be the factor which is associated with the general measure of singing self-efficacy. The qualitative data obtained from the open questions points to some common experiences and practices which student teachers identify as having a strong influence on their efficacy beliefs.

Participants' experiences are helpful in illuminating the four explanatory and interrelating factors Bandura identifies as being critical to the formation of self-efficacy beliefs.

Performance accomplishments relate to our ongoing and direct personal experiences of the skill we are learning. Participants who identified as having high self-efficacy in singing cited group singing experiences such as choirs or kapahaka (Maori singing groups) as important in the formation of their efficacy beliefs. Practice was also seen as being significant and a number of student teachers commented on the value of a broad musical education and instrumental lessons. One stated

> I have played piano from a young age and I believe that my singing ability has developed from this.

Successful choir auditions or selection for solo work also contributed to high singing self-efficacy. One student teacher commented that she was

> encouraged to sing for my own enjoyment, this being the most important thing, not necessarily being 100% performance accurate.

In contrast, student teachers who identified as having low self-efficacy in singing did not cite lack of singing experience as an important factor. A number told of failing to be accepted in the school choir and interpreting that as indicating low ability in singing.

> At intermediate we all had to sing one at a time to the music teacher so she could pick a choir. I never made the choir so I believed that I couldn't sing very well.

Another student teacher commented

> I loved singing as a child but discovered I wasn't that good when I didn't get into the chapel choir at intermediate school.

For some students knockbacks occurred early in life. One student teacher wrote "from early childhood I was told I couldn't sing so I stopped and only mimed". Another noted that her beliefs about her low singing capability developed from "not being chosen for the school choir when 6/7 years old".

Schools which establish auditioned music groups at the primary level need to be aware of the powerful impact this may have on the formation of efficacy beliefs. If primary schools are determined to have elite musical groups they also have a responsibility to work in ways that encourage the development of musical skills in those children who fail to reach the required standard for involvement at the elite level.

Music programmes in which children have the opportunity to take part in a range of music making activities and to experience success are crucial in the primary school years. In practice, for many children, their school music experiences are limited to singing along with tapes that are unsuitable for instructional singing and a weekly 'shout' at school assembly time.

Verbal persuasion encompasses the range of feedback that people learning and developing new skills receive. It appears that individuals' beliefs about their singing capability are particularly susceptible to the negative comments of teachers, family members and peers. One student teacher wrote "when friends joke 'don't sing' I ask myself if there is some truth behind what they say". Unlike the playing of instruments in which the actual sound is produced by the instrument, in singing the individual concerned is the instrument. Unless high self-efficacy is already strongly established, unfavourable comments about the sound tend to be taken very personally and are not necessarily evaluated objectively by the singer. Instead, absolute credibility is given to the so-called audience and deliverer of feedback as with the student teacher who wrote "my brother continually tells me I sing out of tune and because he has perfect pitch I believe him". Although such links have not been clearly established in the literature, it seems from the questionnaire responses that the perception of poor pitch singing gained through feedback from significant others is a crucial factor in the development of low singing self-efficacy. This is consistent with more general findings from a study by Sloboda (1989) who found that many so-called unmusical adults related powerful memories of negative reinforcement, often from school teachers.

Some student teachers formed positive efficacy beliefs in the absence of negative feedback ("no one has ever told me I'm a horrible singer") indicating a belief that when someone does not sing well other people let them know. Almost every feedback comment reported in the questionnaire responses related to how the singing is as opposed to how the singing **could be**.

In spite of a number of low self-efficacy student teachers noting that they could hear that their singing was out of tune, there was no indication that any teacher or family member worked with them to improve the tunefulness of the singing.

> Other people have told me that I can't (sing). It's a bit off-putting because with a little time and appropriate coaching I probably could commented one student teacher. Another who had received significant encouragement wrote children need to be told that EVERYONE can sing if taught and encouraged, instead of emphasis totally on talent.

Vicarious experiences operate in a complex way in the development of efficacy beliefs. Positive identification with family members ("both parents were musically

inclined and I followed them" and "my mum and dad sound terrible so I figure I must too") can contribute to high and low self-efficacy in singing. Lack of identification with family members and others also can contribute to both high and low self-efficacy. One student
teacher with high self-efficacy wrote "when compared to my mother anyone could sing" while a second compared herself unfavourably with a friend "my best friend was a brilliant singer and I was never as good as her." Comparisons with other children or family members are helpful only when children believe they also have the means of achieving success.

Emotional arousal refers to the feelings associated with carrying out the particular action or activity. Very young children usually are unaware that others may be judging their performance when they sing but over time they become more conscious of others' opinions. Encouragement and appreciation engenders enjoyment and positive associations. Conversely, if children are criticised, labelled as tone deaf, or told to 'shut up' it is likely that singing will come to be associated with unpleasant feelings and uncomfortable physiological reactions. Embarrassment, anxiety and fear of unpleasant consequences are not conducive to improved performance. One student teacher related that at the age of eleven "I held a note too long and was told off by the teacher in front of everyone".

A student teacher with high self-efficacy commented that her enjoyment of singing at school "has nurtured my confidence".

The myth of tone deafness persists in New Zealand families and schools. Although vocal development research points to singing as a developmental skill (Davidson, 1986; Moog, 1968; Shuter-Dyson & Gabriel, 1981; Sloboda, 1989; Welch, 1986), in practice it appears to be viewed as a fixed ability trait. This notion is reflected in the singing programmes and practices that operate in schools and on the beliefs that are communicated to children both at school and within their families. Consequently, children tagged as having limited ability in singing are provided with little incentive or opportunity to work harder at developing singing skills. If we believe that singing is a developmental skill and that singing ability can be improved through carefully guided practice, we need to reflect this belief to children through the quality instructional singing programmes offered in schools. Furthermore, self-efficacy theory enables us to understand that the acquisition of skills and knowledge in themselves are insufficient. Rather, effective development in singing will be facilitated when teachers understand and work with the self-beliefs students hold about their capability in singing. We need to set the goal that all our students will echo the words of one participant who wrote "I love to sing - it's good for the soul!"

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Strategies for the Education of Gifted and Talented Music Students: Acceleration Without Speed-Bumps

Ron Brooker

Abstract

This report overviews the various strategies recommended for the education of gifted and talented students in New South Wales and then describes a case study evaluation of the acceleration program in music performance (APMP) at the Sydney Conservatorium of Music and its associated Conservatorium High School. Along with examination results, interviews, self-description questionnaires, coping scales and survey measures were employed to gather data from the students, their teachers, their parents and the school principal. Results of the study show that acceleration was a very appropriate intervention and that the outcomes in all cases were quite successful. The blend of real acceleration benefits and candidates' social and intellectual maturity has avoided the often cited adjustment and attitudinal problems of many educational strategies for the gifted and talented.

Introduction

Braggett's (1993) review of programs and practices for identifying and nurturing giftedness and talent confirms that throughout the 1980s in Australia and New Zealand "there was increasing pressure on State Departments and Ministries of Education...to provide specific programs for gifted and talented children" (p. 817). After the 1989 election of a Conservative government in New South Wales, the NSW Ministry of Education, the Board of Studies, and the NSW Department of School Education all produced policy statements (NSW Government Strategy, 1991; Board of Studies NSW, 1991; NSW Implementation Strategies, 1991) that were widely publicised throughout the community and the teaching profession. Included in these policies and strategies were recommendations for the acceleration of students who achieve curriculum outcomes more quickly than their peers (eg. Policy Statement 2, NSW Implementation Strategies, 1991). Amongst the related implementation strategies for the acceleration was the provision of early entry to study at a tertiary institution. The means for accessing the opportunity to study tertiary subjects were listed as distance education or part-time on-campus study. The latter mode of delivery which requires an easily accessible campus was seen to be the most suitable for the conditions which apply at the (Sydney) Conservatorium High School (CHS).

The association between the CHS, a selective high school for the musically gifted and talented, and the Sydney Conservatorium of Music has been a long and mutually rewarding one. Gifted and talented high school music students, who gain their places in the school via a rigorous auditioning process, have regular lessons with highly qualified and experienced music teachers in their Principal Study instrument. Further ensemble and individual performance opportunities, as well as other instrument studies, are regularly provided throughout the school year by the specially chosen high school music education staff and the tertiary teachers. This close integration of the students' musical studies and their other high school experiences is made possible by the high school's location in premises adjacent to the Conservatorium. With the associated minimal timetabling and movement problems, and the talent encouraging ethos shared by both institutions there has been a regular affirmation of the overall aim of the Gifted and Talented Policy, namely, "to maximise the educational outcomes of schooling for gifted and talented students" (p.3). The 1990 amalgamation of the Sydney Conservatorium with the University of Sydney, and the subsequent 1994 University Review of the Sydney Conservatorium have not changed the entrenched interaction practices, nor diminished the long-established perception of educational advantages flowing from having a music high school linked with a conservatorium.

The impetus of the NSW Government's policy statements stimulated the CHS's executive[1] to implement even further opportunities for developing the talents of their students. In 1993, a

[1] "School principals have the final responsibility for deciding...when any form of accelerated progression is appropriate." (NSW Implementation Stategies, 1991).

pilot scheme to accelerate selected Year 12 students in their study of harmony by providing them with a class presented by a tertiary lecturer on the First Year Bachelor of Music (B. Mus) Harmony I and II curriculum proved to be very successful. All six high school students performed well above the average of the tertiary students studying the same subject. In fact, the first three high school students' results would have placed them in the top 25% of the tertiary group. This success led to the recommendation that the Acceleration in Harmony Program (AHP) be continued, using the same high selection standards, to accelerate successive cohorts of Year 11 and 12 students.

The rationale for acceleration argues that this intervention can provide the benefits of developing potential, satisfying learning needs, and maximising outcomes for gifted and talented students. It is clear though that in applying this rationale to different areas of giftedness and talent that a variety of theoretical and practical issues need to be considered. McPherson (1995, 1996) defines a model for giftedness and talent in music which highlights the varied nature of the dimensions contributing to the move from potential to achievement. The development of musical ability is seen to be provided by learning, training and practice activities that are constantly being influenced by sets of intrapersonal and environmental catalysts. The personal attributes of personality and motivation are continually interacting with the phenomenological factors of significant persons, events, and experienced interventions. Similarly, Hendrickson (1986) has identified the multivariate nature of the development of various precocious musical skills. The different musical aptitude domains were seen to be influenced by personality factors and the roles of significant others, like parents, teachers, and music critics. The significant event of public performance was also detected as having a particularly important effect in the growth and development of the musical careers of the study's four prodigies. In stating that "(i)ntervention is most effective before the onset of adolescence", Hendrickson has acknowledged that the transitional time of adolescence is when the musically precocious have a need to pause and consider their careers, and indeed their lifestyle. Winner and Martino (1993) and Bamberger (1982, 1986) have also referred to this apparent "midlife crisis" of the musically gifted and talented where the increased cognitive facility associated with formal thought causes prodigies to regularly reflect on their music and their lives. Here, the role of families and teachers is thought to be most crucial. As Isaac Stern is quoted as saying, "There has to be someone pushing, a parent or a teacher. ...It's the quality of the parental pushing that helps determine the eventual outcome of the prodigy" (Winn, 1979, p.40).

Many of the high school students at the Conservatorium have the musical gifts, the motivation, the personality, and the experience with significant factors that could result in high musical achievement, but the historical evidence (Henry, 1976) indicates only a small percentage continue their amateur or professional music careers after their high school years. Is the musical "midlife crisis" claiming too many casualties? Is there another intervention which could facilitate the transition to the next level? Is an acceleration program in music performance able to bridge the gap?

Procedure

In the light of the AHP success and with the continuing momentum of the NSW Government's policies, the CHS executive decided to extend the Year 12 acceleration programs to include performance studies. At the end of the 1994 school year, eligible Year 11 students were invited to audition for places in the Acceleration Program in Music Performance (APMP). Audition panels comprising the Head of the Performance Studies School, relevant Heads of Departments or their nominee, and the CHS Principal then conducted comprehensive auditions and made recommendations. In a concurrent process, the CHS Principal with the Head Music Teacher reviewed the candidates' academic results in the non-music subjects chosen for their Higher School Certificate (HSC) examination and, in consultation with the other experienced high school teachers, their socio-emotional preparedness for the demands of high-level music performance studies. On the basis of this rigorous process and the high standard criteria set for this program only three candidates were admitted to the first APMP.

An educational psychologist, attached to the Conservatorium's University College, was appointed to monitor and evaluate the APMP's process and its outcomes. Data were collected at

the onset, during, and on completion of the program. Brief open-ended survey forms requesting information about the respondents' knowledge of APMP, their motivation to be in the APMP, the perceived advantages and disadvantages of APMP, and the future intentions of the candidate were completed by the candidates themselves, a parent of each candidate, and the candidates' performance studies teacher. The candidates also completed the Self Description Questionnaire- II (Marsh, 1990) and the Adolescent Coping Scale (ACS)- General Long Form (Frydenberg and Lewis, 1993). Academic records of the candidates' Years 11 and 12 examinations were made available with the consent of the candidates and their parents. Published HSC results in a January edition of the *Sydney Morning Herald* were consulted to obtain state-wide comparative performance data.

Results

The results of the data collection are presented in the areas of Performance Studies, Other Music and Non-music Studies, Personal Adjustment, and Interview and Survey Responses.

Performance Studies

The three candidates selected for the initial APMP were all female Year 12 students at the CHS, whose Principal Instruments were, respectively, flute, guitar, and oboe. As the prime objective of the APMP was the further development of the candidates' performance potential in their Principal Instrument studies, the results achieved in the recital examinations are the most important. Each student received a High Distinction result for their end-of-year Bachelor of Music (B Mus) Principal Study I examination, and automatic progression into the Second Year B Mus (Performance) program at the Sydney Conservatorium of Music.

Other Music and Non-music Studies

Each candidate's results in the examinations leading up to the HSC were consistent with their high to relatively high performance in Year 11, prior to their commencement in the APMP. At the HSC examination itself, two of the candidates were listed in the 3-Unit Music order of merit (one fourth and the other sixth). One of the same students was also listed amongst the top 1,000 Tertiary Entrance Record (TER) achievers in the state, while the third student's TER also placed her in the top 5,000 places at the NSW HSC examination. All three have subsequently enrolled in tertiary music courses.

Personal Adjustment

Socio-emotional responses measured by two Australian-normed instruments indicate that the three candidates were all consistently positive in their perceptions of their abilities and their adjustment. The combined SDQ- II scores placed each candidate in the average to above-average female range of Total Self-Concept (percentile rankings of 48, 89, and 69, respectively). The sources of the combined scores, however, varied according to the candidates' perceptions of their physical appearance, relations with parents, emotional stability, and mathematics or verbal ability. Consistently above-average rankings were indicated in the Opposite-Sex Relations, Same-Sex Relations and General School scales for all three candidates.

In the ACS profiles, there were universal preferences for positively constructive coping styles, like Focus on Solving the Problem and Work Hard and Achieve (average rankings of 76 and 85.3, respectively, which both fall in the Used Frequently category). Each candidate's two most frequently used coping strategies were Work Hard and Achieve and then, respectively, Focus on the Positive, Seek Relaxing Diversions, and Seek Social Support. The two least used strategies were Seek Spiritual Support and, respectively, Invest in Close Friends, Not Coping, and Keep to Self.

Interview and Survey Responses

All three candidates were aware of the APMP prime objective of extending their work in performance studies, and two indicated they knew they would be advanced in the B.Mus. program. Their reasons for applying included having more opportunities to perform, to become familiar with the B.Mus. course and its standards, to get other professional musicians' feedback, and "because my teacher suggested it". Their views of the benefits of APMP were increased performing experience, contact with Conservatorium staff, and "listening to other

B.Mus. students perform". The disadvantages were unanimously identified as the communication problems between the CHS and the Conservatorium, which resulted in less performance opportunities, lack of fore-warning about performance requirements, and also a failure to provide feedback. The candidates' predictions about their future were surprisingly unclear and, at this stage in all cases, intimated that they would not be continuing into the B.Mus. program in the next year.

The parents' knowledge of the APMP was sketchy but nonetheless sufficient concerning the prime objective of improving performance. They realised the advantages of more performing opportunities, the advanced standing benefits, and the advantages of associating with an advanced musical peer group. The parents separately identified communication problems, social adjustment difficulties, and the inappropriateness of acceleration for those students who do not intend continuing music studies. On the issue of the education system's role of providing for the gifted and talented, the parents again separately identified more opportunities for chamber music, financial support for overseas study, and the implementation of strategies to strengthen the CHS's pool of "genuinely" gifted and talented students. In the matter of the candidates' careers beyond high school, the parents interestingly did not provide the stereotypical "pushing parent" responses. They were all consistent in their deference to their child's own decision and their hope that they would be happy achievers in their chosen field of endeavour.

Performance teachers' responses were obtained from only two of the candidates' teachers (the third was on tour). They indicated they had not received any information about the APMP. Advantages of an APMP were seen as "dubious" or, at the most, the tenuous ones of some additional performance experience and some association with tertiary students. The disadvantages were seen as "more than I can think of" and less performance opportunities than would normally obtain. Suggested possible improvements were extra lessons and the education system's flexible delivery of similar performance acceleration opportunities to other schools. Acceleration in performance was seen to be appropriate in all instruments except voice (for maturity reasons) and in cases where "outstanding capabilities" were not demonstrated.

The above measures have been the source of the feedback which helps to determine the impact of the APMP in its first year.

Discussion, Conclusion, and Recommendations

By even the most stringent assessment, the APMP has been a success. Its prime objective has clearly been satisfied, and its associated benefits of advanced standing in current degree programs achieved. Notwithstanding this positive feedback, the process of its operation can be improved by better communication and consultation. So too can its impact be enhanced by appropriate extensions to other eligible candidates in other schools.

Perhaps the clearest observation of the APMP's first year of implementation has been the very professional selection process that has resulted in three very mature, personable, clear-thinking adolescents undertaking a valuable acceleration intervention.

The issues of a musical prodigy's "midlife crisis" and the apparently essential parent or teacher "pushing" for success seems to have been minimised by the timing of the intervention. Clearly, many of the effects of youthful performer have been dissipated by the candidates being in the later adolescent years and, in this instance, being earlier maturing females. These results were achieved in no small measure by the careful selection processes. To maintain these outcomes, it is recommended that the consultative selection practices of an informed High School Principal, Head Teacher Music and, to a lesser extent, the associated Conservatorium staff be systematised for future and, where appropriate, broader implementation of APMP. On the more pragmatic side of the implementation's application, several other recommendations were made to the University and the Conservatorium. For example, the exemption from Higher Education Contribution Scheme (HECS) fees for the accelerating year, the maintenance and reporting of accurate records of achievement for those in the program, and, most significantly, the establishment of an accelerant pathway that would enable completion of the B.Mus. degree in three full-time years.

In summary, the most enduring impression that this neutral observer has obtained is that this APMP was a most appropriate intervention in its content, its timing, and its outcomes. Its process should be improved but its continuation is imperative.

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The Effects of a Hypermedia Program, Cognitive Style, and Gender on Middle School Students' Music Achievement

Jeffrey E. Bush

Abstract

This study investigated the effects of a hypermedia program, cognitive style, and gender on middle school students' achievement in music. Four groups of middle school students were identified: field dependent males; field dependent females; field independent males; and, field independent females. The experimental group received instruction on steel band orchestras of Trinidad via hypermedia program whilst the control group was taught similar material through an expository teaching lesson. An achievement posttest was administered immediately after treatment and again approximately six weeks later. Although previous research suggests that attitudes toward computers may differ between males and females, the nonsignificant main effects (both tests) for gender and nonsignificant interactions between gender and instructional mode found in this study demonstrate that boys and girls are equally capable of learning in a music classroom through hypermedia and traditional instruction. Likewise the nonsignificant interaction between gender and the (two) posttest variable indicate no gender differences in the long-term retention of information.

Introduction

Multimedia resources that combine text, still pictures, video, and audio are now available for the music classroom. Some researchers believe that multimedia materials may facilitate learning for today's children, many of whom live in multiple-stimulus environments (Kirshbaum, cited in Williams & Webster, 1996). Although several education researchers have demonstrated that some students score higher on achievement tests after utilizing computers (Hofstetter, 1985; Kulik, Bangert-Drowns, & Williams, 1983; Kulik, Kulik, & Cohen, 1980), not all students fare better than with traditional instruction (Clark, 1983, 1985; Kozma, 1991). These conflicting results suggest the possibility that other variables, such as cognitive style and gender, should be investigated in relation to mode of instruction. Tests available in the cognitive domain have been demonstrated to be reliable indicators of school-aged children's cognitive styles (Leahy & Zallatimo, 1985; Lockheed, Harris, Stone, & Fitzgerald, 1977; Mahlios & D'Angelo, 1983; Thompson, Pitts, & Gipe, 1983; Witkin, Oltman, Raskin, & Karp, 1971). In particular, the reception construct of field dependence/independence, which has been the subject of considerable scrutiny (Keefe, 1979; Thompson, 1988), appears to have a strong relationship with instruction (Thompson, 1988).

Field dependence/independence is a continuum measurement of how individuals experience and perceive their environment. Field dependent (FD) individuals are strongly influenced by the organization of the field of information being perceived; specific parts or elements of the domain tend to fuse with the whole (Witkin et al., 1971). Field independent (FI) individuals tend to perceive discrete elements embedded in a background (Keefe, 1979).

There appears to be a strong relationship between FD/I and the educational use of computers. In general education studies, researchers have discovered that FI subjects tend to outperform FD subjects on achievement tests after being exposed to computer-assisted learning (Canelos, Taylor, Dwyer, & Belland, 1988; Carrier, Davidson, Higson, & Williams, 1984; Lin & Davidson, 1994; Stevens, 1983; Wang, 1989/1990; Weller, Repman, & Rooze, 1994). Similarly, in their study of nonmusic majors enrolled in an introductory music class, Ellis and McCoy (1990) discovered that FI students scored higher than FD subjects on a researcher-designed music achievement test. Schmidt (1984) found that FI college students achieved higher scores on an aural skills examination than did FD students, and King (1983) reported that FI high school instrumental music students scored significantly higher than FD students on a test of music reading achievement. On the other hand, Schmidt and Lewis (1987) found that psychomotor activities increased perception of tempo for FD fourth-grade music students more than for FI students. Finally, Willett and Netusial (1989) reported no significant difference in music achievement posttest scores between FD and FI fourth-grade subjects.

The majority of research devoted to gender and instructional technology deals with differences in attitudes. Researchers generally report that females hold less positive attitudes toward computer-assisted instruction than do males (Collis & Ollila, 1986; DeSantis & Youniss, 1991; Hattie & Fitzgerald, 1987; Kirk, 1992; Krendl & Broihier, 1992; Krendl, Broihier, & Fleetwood, 1989; Wilder, Mackie, & Cooper, 1985). Recent studies suggest that gender differences in attitudes toward computers still exist (Busch, 1995; Volman, 1995; Williams, Ogletree, Woodburn, & Raffeld, 1993).

The majority of research on the retention of knowledge and the use of computers has dealt with the amount of control the subject has over his or her learning (Gray, 1987, 1989; Higgins & Boone, 1990; Murphy & Davidson, 1991; Silverstein, 1989). In addition, researchers have examined the effects of immediate versus delayed feedback on knowledge retention scores in relation to computerized instruction (Chanond, 1988; Moisey, 1988; Wagner, 1983/1984). Unfortunately, the results of these experiments were contradictory and inconclusive.

In a review of traditional studies not involving computerized instruction, Goodenough (1976) reported that FI subjects usually remembered information better than FD individuals. In a meta-analysis, Kulik, Bangert-Drowns, and Williams (1983) found that retention scores were generally higher for subjects who experienced computer-based instruction, although the retention differences were not statistically significant. Experts appear to differ on how soon after treatment information retention should be measured. In various studies, tests for retention were administered from immediately after treatment (Gray, 1989) to eight weeks later (Murphy & Davidson, 1991). It is clear that the time of test variable can have a significant effect. For example, re-tests given relatively soon after initial posttests sometimes show an increase in achievement, which suggests that the initial posttest may function as a rehearsal or added study session (Canelos, Murphy, Blomhach, & Heck, 1980). Regardless, most researchers in the aforementioned studies considered any information retention longer than four weeks as long term.

Although cognitive style, gender, and long-term retention have been investigated as they relate to the use of computers in education, there has been no research on how these four variables interact with each other. Consequently, the purpose of this study was to investigate the effects of a hypermedia program, cognitive style, and gender on the short- and long-term achievement of middle school music students.

Method

Subjects were sixth- and seventh-graders from a western Canadian elementary school in a middle income neighborhood. To control novelty and possibly other Hawthorne effects (Clark, 1983, 1985; Williams & Brown, 1991), only students who regularly use computers in school were employed as subjects in this study.

Potential subjects were given the *Group Embedded Figures Test* (GEFT) (Oltman, Raskin, & Witkin, 1971), a popular instrument for measuring FD/I in educational settings due to its relatively high reliability (Witkin et al., 1971) and its previous use in classroom research (Leahy & Zallatimo, 1985; Lockheed et al., 1977; Mahlios & D'Angelo, 1983; Thompson et al., 1983; Witkin et al., 1971). Published validity scores for the GEFT are .82 for males and .63 for females; reliability estimates for the GEFT are .82 for both males and females (Witkin et al., 1971). The current study obtained mean scores of 8.79 for male subjects and 8.66 for female subjects. These findings are in line with previously published research (Mahlios & D'Angelo, 1983; Thompson et al., 1983; Witkin et al., 1971).

Two of the six groups identified by the GEFT, field indeterminant males and field indeterminant females, were excluded from further analyses, and three remaining subjects failed to compete the study. The four remaining groups consisted of: FD males (N=19), FD females (N=21), FI males (N=21), and FI females (N=23). Approximately half of the subjects from each of the four classifications were randomly assigned to the hypermedia instruction (experimental) group (N=41) and the other half to the expository teaching (control) group (N=43).

A brief researcher-designed test was administered to all students to measure the subjects' previous knowledge about the steel bands of Trinidad. No subjects were eliminated from the study due to previous knowledge.

The researcher created two hypermedia programs for this project. The first program, entitled "The World Music Demonstration Stack," was designed to familiarize subjects with hypermedia. The second program, entitled "Steel Bands and Their Music," was developed for use as the treatment. Both programs include text, audio (a CD-ROM player controlled by a computer), scanned pictures, photographs, and short video segments or clips. The researcher used a Macintosh *Centris 660AV* computer to design the hypermedia programs. *Hypercard 2.2* was used as the authoring program, with Voyager's *CD Audio Toolkit* software utilized to control audio resources. Photographs were digitized for inclusion into the program utilizing a *Scanman III* color scanner and Adobe *Photoshop* scanning software. The computer application *Quicktime 2.0* was utilized to create and view the video segments. Several minor changes were made to the software programs as a result of pilot testing. The computer employed to create the hypermedia programs was used throughout the experiment.

Using "The World Music Demonstration Stack," subjects in the experimental group received a class lesson on how to use a hypermedia computer program. Over a period of two weeks, each subject in the experimental group was given 40 minutes to investigate the steel band hypermedia program. Subjects were read a common set of instructions and given a two-page overview of the objectives of the music lesson. Subjects were encouraged to refer to and write on this guide throughout their hypermedia exploration period.

A 40-minute expository lesson was created and taught by the researcher to the control group. All video and audio examples in this lesson were similar to those utilized in the hypermedia program.

The achievement measurement instrument, a 20-question researcher-designed multiple choice test, was reviewed favorably by two university music education faculty members for grade-level appropriateness. Content validity was confirmed by a leading North American scholar in Trinidad steel band practices and history. Following the pilot test, questions answered incorrectly by more than 40% or correctly by more than 60% of the subjects were re-written. Each group completed the first posttest immediately after their learning experience and again approximately six weeks later (second posttest).

Reliability coefficients of $r = .66$ and $r = .56$ were calculated for the first and second posttests, respectively, using the split-half method with Spearman-Brown correction. Although not high, coefficients of this magnitude are considered adequate for exploratory research (Guilford & Fruchter, 1978).

Results

The effects of instructional mode, cognitive style, and gender on the two posttests were examined through a multiple analysis of variance (MANOVA) (Table 1). There were significant differences in favor of the control group for the main MANOVA effect of instructional mode and for both univariate effects (both posttests). Similarly, there were significant differences in favor of FI subjects for the main MANOVA effect of cognitive style and for both univariate effects. There was a nonsignificant difference for the main MANOVA effect of gender.

There was a significant univariate interaction between instructional mode and cognitive style for the first posttest. Contrast analysis revealed that FD subjects who received hypermedia instruction scored significantly lower than any other combination of instructional mode and cognitive style on the first posttest ($F = 22.32$, df = 1, $p < .0001$). Furthermore, despite the nonsignificant interaction, contrast analysis revealed a similar difference on the second posttest ($F = 21.10$, df = 1, $p < .0001$). There were no other significant MANOVA or univariate interactions among the variables ($p > .05$).

To further examine any possible long-term effects of the treatment, a mixed-model analysis of variance with three between factors (instructional mode, cognitive style, gender) and one within (repeated) factor (the two posttests) was computed. There was a significant difference on the repeated measure ($F = 129.10$, df = 1, $p < .001$) in favor of the first posttest. However, there were no significant interactions between the three independent and posttest variables ($p > .05$).

Discussion

The significant difference between the two posttests suggests that the subjects forgot some of the material during the six-week period. The fact that there were no significant interactions between the posttest variable and any of the independent variables suggests that the retention loss was similar across subjects of each cognitive style and gender and for those who experienced different instructional modes.

Because previous research suggests that hypermedia and expository teaching models achieve similar results (Bauer, 1994/1995; Fortney, 1995), the significant difference in favor of the control group was unexpected. One possible reason is that multiple-choice tests of factual information may not be valid measures of the types of learning that occurred under the experimental condition. In addition, the control group subjects may have enjoyed an advantage because the expository teaching lesson was similar to the way most students receive instruction in preparation for multiple-choice tests.

The fact that the hypermedia program covered much more information than did the expository teaching lesson may have played a part in the significant difference in favor of the control group. Like Goodson (1992/1993), the author discovered that the hypermedia music program required less instructional time to complete than did the expository teaching lesson. Because the researcher ensured that all information covered on the test was presented in the expository lesson, the control group may have had less material to "filter" through for the tests.

Field independent subjects registered a significantly higher overall mean score than did FD subjects, but FD subjects in the control group performed as well as FI subjects who experienced either instructional mode. In other words, the hypermedia program was as effective as the expository teaching model for FI subjects, but not for FD subjects, which reinforces the findings of most earlier studies (Canelos et al., 1988; Carrier et al., 1984; Ellis & McCoy, 1990; Lin & Davidson, 1994; Schmidt & Lewis, 1987; Stevens, 1983; Wang, 1989/1990; Weller et al., 1994).

The nonsignificant main effects (multivariate and univariate) for gender and nonsignificant interactions (multivariate and univariate) between gender and instructional mode found in this study demonstrate that boys and girls are equally capable of learning in a music classroom through hypermedia and traditional instruction. Likewise, the nonsignificant interaction between gender and the posttest variable indicates no gender difference in the long-term retention of information.

Previous research has demonstrated the usefulness and flexibility of hypermedia instruction in music education (Hedden & Klein, 1993; Sigurjonsson, 1991; Woodruff & Heeler, 1991, 1993). The present study demonstrated the effectiveness of hypermedia instruction for some middle school subjects and that girls and boys are equally capable of achieving success in middle school music classes regardless of instructional mode. Finally, informal observations by the researcher suggested that students in the experimental group were on-task and seemed relatively unaware of distractions such as school bells.

The results of this study suggest a need to further investigate variables that may facilitate long-term retention. A replication study employing learning style inventories is recommended, and studies utilizing subjects drawn from older and younger populations might prove fruitful. Finally, additional research is needed to determine the best ways to evaluate hypermedia-assisted instruction, including a longer test instrument to improve reliability.

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MANOVA achievement score results by instructional mode, cognitive style, and gender

Source	Wilk's Lambda	SS	df	MS	F	p
Instructional Mode (I)	.879				5.18	.0078
First Posttest		91.32	1	91.32	9.94	.0023
Second Posttest		39.91	1	39.91	6.29	.0030
Cognitive Style (CS)	.843				6.97	.0017
First Posttest		86.62	1	86.62	9.43	.0030
Second Posttest		81.72	1	81.72	12.89	.0006
Gender (G)	.977				.89	.4151
I x CS	.937				2.54	.0860
First Posttest		39.86	1	39.86	4.34	.0406
I x G	.998				.09	.9177
CS x G	.995				.20	.8222
I x CS x G	.958				1.66	.1977

Note: Only main and interaction MANOVA effects and significant univariate effects are included; all other univariate effects and interactions were not significant ($p > .05$).

Computer-assisted Visual Feedback in the Teaching of Singing

Jean Callaghan, William Thorpe & Jan van Doorn

Abstract

The paper reports a pilot study on the use of computer-assisted visual feedback in the teaching of singing. the study aims to provide answers to the following two questions: 1. Is it feasible and productive to utilise computer technology for the purpose of assisting the learning of singing? 2. Can a simple visual feedback of voice parameters, using existing speech analysis technology provide significant benefits to students of singing?

Introduction

Learning to sing commonly uses a master-apprentice approach relying on modelling, coaching, exploration, reflection and feedback. As Collins (1991) has pointed out, computer technology is well adapted to this kind of apprenticeship training. Recent studies suggest that musical performance skills depend largely on practice and self-regulated learning, activities greatly assisted by feedback (Butler & Winne, 1995; Weidenbach, 1996). The use of visual feedback of voice and articulation parameters to assist in the teaching of singing has been advocated for at least 30 years (Scott, 1968) and is now being used in some tertiary education institutions (Miller & Franco, 1991; Nisbet, 1995; Miller & Doing, 1998).

In speech pathology and second-language learning visual feedback is better established as an instructional tool. For instance, commercial systems such as the IBM Speech Viewer and the Kay CSL have been specifically developed for clinical applications. Visual feedback in these areas allows learners to be actively involved in making conscious judgments about their own speech, it assists with explaining abstract concepts of speech articulation, it provides more consistent feedback than a listener with more opportunities to practise speech production skills (Maki, 1980), and it provides enhancement of the speech perception process (Alvarez et al, 1998).

It has been surmised that, for singing, visual feedback would provide information to supplement the student's own aural and kinaesthetic feedback and the verbal feedback provided by the teacher. Indeed, a group from the Music Department of Drew University, New Jersey advocating the use of technology in singing teaching has claimed that 'the differential between the student's perception and acoustic reality is a massive roadblock to the learning process' (Nair, 1997). This group is highly enthusiastic about the introduction of visual feedback of spectrographic features to assist students of singing to overcome that block, but to date there are few evaluative studies of visual feedback in singing teaching. In 1989, Welch, Howard & Rush reported a study trialling the use of real-time visual feedback in the development of vocal pitch accuracy in singing with a class of seven-year-old school children. Those using the interactive software, without adult intervention, achieved a significant improvement in vocal pitch matching ability after one school term. More recently Rossiter et al. (1996) compared the effectiveness of teaching using visual feedback of vocal parameters with conventional teaching methods. That study concluded that instruction using visual feedback was able to produce more consistent and sustained improvements in parameters related to vocal performance than a conventional singing instruction method.

Evaluative studies of visual feedback of voice and speech parameters in any area of speech pathology, second language learning or singing teaching will need to address several questions: Do methods that use visual feedback provide better results (e.g. improved pronunciation, better pitch matching, or more consistent production of the singer's formant) than conventional methods? Or can they obtain the same results more quickly? Will users readily accept the invasion of computer technology into the clinic, classroom or studio? Despite the importance of this last question to the successful introduction of visual feedback there have been few studies of this aspect in either speech pathology or second-language learning. Most evaluative studies have concentrated on the effectiveness of the device from an outcomes perspective (e.g. Pratt,

Heintzelman & Deming, 1993; Nouza & Madlikova, 1998). However, one study that has looked at learners' perceptions of using visual feedback in second language learning reported that they found it a positive experience (Oster, 1996).

The current study looks at the introduction of technology into the singing studio environment from the important perspective of user experience, asking the following questions:

> Is it feasible and productive to utilise computer technology for the purpose of assisting the learning of singing ?
>
> Can a simple visual feedback of voice parameters, using existing speech analysis technology, provide significant benefits to students who are learning to sing ?

Method

Participants

Four singing teachers and eight students participated in the research. The teachers - two female and two male - ranged in age from 46 to 63 years and were all well qualified and highly experienced. All taught in private studio and three, in addition, taught in other settings (university, conservatorium, fee-paying secondary school). Their experience with computing ranged from none at all to usage for word-processing, spread-sheets and e-mail. Characteristics of the teachers are summarised in Table 1. The teachers worked with their own students: three girls (aged 14, 15 and 16), one boy (aged 12), one adult female (aged 28) and three adult males (aged 31, 28 and mid-40s). The students exhibited a range of computer literacy, from having no computer experience at all to being highly-sophisticated computer users. Characteristics of the students are summarised in Table 2.

Procedure

The teachers were provided with an initial training session of approximately two hours in duration where they were given instructions and practice in using the computer equipment. Prior to the training, all the teachers had some familiarity with phonetic symbols and with the concept of formants; they had little detailed knowledge of acoustic analysis. They were therefore provided with some background information on acoustic analysis techniques, to assist them in interpreting displays such as spectrograms and formant charts. During this session, the teachers were asked to decide how they could use the system within their lessons.

Each teacher gave one lesson to two students. They used one or more of the feedback modalities described below for at least part of the lesson. Lessons were conducted in a studio at the University containing the computer system and an electronic piano (Clavinova, Yamaha). One of the investigators was present at the beginning of each lesson to ensure that the equipment was operational, and thereafter was available on call in an adjacent room to provide assistance with the computer equipment if required. At the completion of their two lessons, each teacher was interviewed by one of the investigators.

Equipment

The equipment consisted of the Computer Speech Lab (Kay Elemetrics) with the microphone mounted on a stand. For this study four of Kay's programs were invoked: CSL (for spectrographic analysis), Sona-Match (formant and vowel analysis), Visi-Pitch (pitch display), and Visi-Pitch Games (visual feedback through a games-oriented model).

The software provided by Kay offers both menu and keyboard control, with the ability to assign particular operations to individual keys. A set of key commands was defined to encapsulate the range of actions identified in the training session as being of use. A template describing the action of each key was printed and provided to the teachers. As much as possible, each action was programmed into a single key-press, and dialog boxes were disabled or bypassed to try to avoid any distractions to the teacher. For spectrographic display, a delayed-time display was employed (making use of the CSL standard software). The frequency range was set to 5 kHz to focus mainly on the voiced regions of the spectrum, with the option of either wide-band (600 Hz) or narrow-band (30 Hz) analyses. This program was used to

provide feedback about types of voice onset, sustained voice quality (singer's formant intensity), and vibrato patterns.

The Sona-Match program provides two real-time modes: a chart of vowel identity with respect to a graph of Formant 2 versus Formant 1 frequencies; and a display of vowel resonance peaks, showing a plot of sound intensity versus frequency at each instant in time. The spectral intensity is computed via the LPC algorithm. The frequency display therefore represents mainly the formant resonances of the sound, with the first two formants being automatically located for use in the vowel chart. The spectral resonance display was used to give feedback about the voice quality, especially with regard to maintaining consistency across the pitch range. A set of Italian vowels was installed (Ferrero et al., 1978) in addition to the standard (American) English vowel charts. Alternatively, the teacher could demonstrate a desired vowel and the student try to match the resulting target area on the display.

The Visi-Pitch program gives real-time display of pitch and sound intensity. Two displays were provided so that the teacher could display and replay two sets of data. The pitch range was initially set at 0-600 Hz, but could be adjusted by the teacher if necessary. The Visi-Pitch games program provides a range of modules that give feedback of pitch and vocal intensity through manipulation of pictures on the screen. Both these programs were used to give visual feedback about the magnitude of pitch excursions. Some use was also made of the comparative features of the dual displays in the Visi-Pitch program to give feedback on the vibrato in the teacher's and in the student's voice.

Table 1: Participant Teachers

	Age	Gender	Training for Singing Teaching*	Teaching	Years Teaching Singing	Computer Skills	Familiarity with Acoustic Analysis Displays	Familiarity with Vowel Quad.
Teacher A	63	F	Grad. Cert. Continuing professional education	Private studio	15	No	Little	No
Teacher B	46	F	MA Continuing professional education	Private studio Fee-paying secondary school	10	Yes	Little	Yes
Teacher C	46	M	Diploma Continuing professional education	Private studio Conservatorium	30	No	Yes	Yes
Teacher D	51	M	Continuing professional education	Private studio University	20	Yes	No	Little

* In addition to musical training and performance experience

Table 2: Participant Students

	Age	Gender	Singing Training	Com-puter Skills	Famili-arity Acoustic Analysis Displays	Famili-arity with Vowel Quad.
Student 1	15	F	4 years	No	No	No
Student 2	14	F	3 years	No	No	No
Student 3	16	F	18 months	No	Yes	Yes
Student 4	12	M	9 months	Yes	No	No
Student 5	28	F	5 years	Yes	Yes	No
Student 6	31	M	10 years	Yes	Yes	No
Student 7	40s	M	2 months (+ years earlier)	Yes	No	No
Student 8	28	M	9 months	No	No	Yes

Results

Usefulness

After their initial training in the use of the technology, the participant teachers made their own decisions about what aspects to employ and how to incorporate them into their two trial lessons. Teacher A taught her two teenage students together using all modules, while the other three teachers taught individual lessons using slightly different aspects of the technology to meet the differing needs of their students. The formant and vowel analysis module was used in all eight lessons, the pitch display in three, and the games in four. The aims of the lessons varied from correcting specific vowels, through increasing awareness of the singer's formant, teaching vibrato, and helping to eradicate the pitch break in a male voice at peak of mutation, to improving poor-pitch singing (see Table 3).

All four teachers found the computer-assisted visual feedback useful. Reactions varied from: 'Yes, it is useful, but it wouldn't work with all students' (Teacher A) to 'Enormously useful, extremely exciting!' (Teacher C). Teacher C, who worked to correct mispronunciation of specific vowels, used the analysis on speech-quality singing and was delighted with the results, observing that Student 5 managed to achieve in that one session what they had been working on together all year. With Student 6, he modelled correct vowels, recorded them, and got the student to match those, achieving a marked improvement there also. Teacher D commented, 'I like the way you can relate what appears on the screen to the front/back of the mouth and to the position of the tongue. Students can understand that that has a direct correlation with what they are doing with their muscles.' All teachers found the formant analysis extremely useful. The spectrographic analysis was adapted to teaching different types of vocal onset; to teaching production of the singer's formant for different vowels and on changing pitch; to teaching vibrato; and to showing dynamics. Teacher B was delighted with Student 3's achievement in respect to vibrato: 'Basically, she learnt the difference between an amplitude vibrato and a pitch vibrato. It helped her a lot: she'll remember that.'

Table 3: Results

	Lesson Aims	Usefulness	Difficulties	Serendipity
Teacher A/ Student 1	Vowels Twang Breath control	Limited Yes Yes	Not suitable for high voice; It. vowels not quite right	Leapfrog game useful for sustained voicing
Teacher A/ Student 2	Vowels Twang Dynamics	Limited Yes Yes	Not suitable for high voice; It. vowels not quite right	Leapfrog game useful for sustained voicing
Teacher B/ Student 3	Vowels Vowel modification Vibrato Onset Effect of posture	Limited Limited Very useful Useful Useful	Not suitable for high voice. Eng.-lang. vowels unsuitable	 Learnt difference between pitch vibrato and amplitude vibrato
Teacher B/ Student 4	Voice change Effect of posture Italian vowels	No Yes Limited	Teacher unable to read relevant information Seemed incorrect for singing	Games proved useful for strengthening the voice
Teacher C/ Student 5	Vowels (at speech level)	Extremely useful	Would like singing vowels for a range of languages	
Teacher C/ Student 6	Vowels (at speech level) Singer's formant	Extremely useful Useful	 Would like real-time feedback and aural feedback	
Teacher D/ Student 7	Italian vowels Effect of posture	Limited Useful	Only suitable for speech Fixed microphone limiting	Useful for maintaining the singer's formant across vowels and across leaps
Teacher D/ Student 8	Pitch	Inadequate	Lack of specific pitch Fixed microphone limiting	Hummingbird game was of some use Effects of high larynx and poor posture showed on spectrograph

Difficulties

While all teachers found the vowel analysis useful, they also found it frustrating in some respects. Teachers A and B, who worked with female adolescents, found it inadequate for the high female voice. Teacher B commented that the American vowels were not ideal for classical

singing and Teachers A and D felt that the Italian vowels provided were perhaps not correct for singing. Also, the recognition of sung vowels on the vowel chart was poor for some voices, particularly at high pitches. The fact that the red dots indicating the location of vowels ('blood splatters' as they were commonly termed) remained on the screen made for confusion after a number of attempts.

Teacher B, who hoped that using the spectrograph to compare the upper and lower range of the changing voice would assist in blending the range, found the display inadequate for that purpose.

Teachers expressed frustration that none of the modules was adequate for specific work on poor-pitch singing. Teacher D, who worked with Student 8 specifically on pitch, felt that aural prompting of the target pitch was required for the visual feedback to be really useful and that the pitch targets presented in the 'Hummingbird' game needed to be assigned specific pitches.

Discussion

Results of this initial study certainly suggest that it is both feasible and productive to utilise computer technology for the purpose of assisting the learning of singing. As Teacher C said:

> The students found that being able to plot things visually was an enormous bonus - having that immediate feedback. Normally in the studio, they do something, I listen, they stop, I give feedback, they try again. That's a laborious process. There's also a communication difficulty - I can't guarantee that what I feed back they interpret exactly as I mean it. Also there's the frustration and feeling of being judged that comes from the human interaction. The machine is non-judgmental and working that way is perceived as fun. Children of this generation are very comfortable with machines and trust them. It's mutual exploration rather than my telling them what to do.

All the participant teachers found the technology useful and made constructive suggestions both on possible improvements and on use in the teaching/learning process.

Teacher D pointed out that our use of a fixed microphone on a stand was very inflexible and could be confronting to a student. Getting the correct angle for using the microphone while also being able to see the monitor caused some problems and affected head position. A microphone attached to a head fitting was suggested. Teachers C and D also suggested incorporating aural feedback to the right ear.

Teacher B pointed out that using the technology meant losing eye contact with the student, since both were relating to the computer monitor rather than to each other. All the participant teachers were conscious that although in a lesson it was possible to achieve quick results using the computer, time and practice would be needed for the student to acquire the 'muscle memory' necessary for motor learning. They therefore suggested that the technology would be of most use for student practice sessions: 'It is terrific to get a student to make an immediate change through the visual feedback, but in achieving muscle memory it would be great to be able to put a disk in and say "this is the model of your best effort - go and practise matching it".' (Teacher B). None of the teachers felt they would use the technology in all lessons or for all students.

While the results suggest that computer literacy did not impact on the usefulness of the technology, Teacher B cautioned that 'it's only as good as the teacher is good at analysing the information'.

All the students participating in this initial investigation derived some benefit from the simple visual feedback of voice parameters using existing speech analysis technology. It is clear, however, that further modifications of that technology are desirable. The difference between spoken vowels and sung vowels has been long acknowledged (Titze, 1995). The need in singing to produce specific pitches, a range of vowels in different languages and appropriate to

different styles, and the modification of vowels to meet aesthetic demands all require modification of the technology designed for speech.

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Environmental Support for the Development of Musical Talent: The Impact of the Musical Involvement of Parents in the Homes of Talented Young Australian Musicians

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Abstract

Studies by Sosniak (1985), Sloboda and Howe (1991), and Howe and Sloboda (1991) considered the facilitative impact of the musical involvements of parents on the development of their child's musical potential. Music in the home is well documented as being a factor which aids the *normative* development (Hargreaves, 1996) of musical competencies (Larsen, 1987; Papousek, 1996). The type of parental musical engagements reported in the literature are usually confined to intuitive parenting practices (Papousek, 1996) or music listening activities (Larsen, 1987). With respect to *expert* musical development (Hargreaves, 1996) the findings of the research literature do not concur. This paper, based upon an Australian study of families of talented young musicians, examines three dimensions of parental musical involvement, and the environmental influence that these may have upon the development of the child's musical potential. The three dimensions are; *consideration of self as musical*, *past or current involvement with formal musical tuition* and *current involvements with musical activities*.

Introduction

This paper reports data collected as part of a more extensive Australia-wide study which explores aspects of environmental support provided for the development of musical talent in a sample of 194 families of talented young musicians. Dimensions of the talented child's home environment were considered through quantitative and qualitative data provided by a single responding parent in each family. Mothers, aged between 30 and 49 years (77.8%) accounted for 81.4% of responses.

Parents' consideration of self as musical

Parents were asked to indicate if they considered themselves to be *musical* and if so, *in what ways?* Parents provided quantitative and qualitative responses as evidence in support of consideration of their own *musicality*. Two thirds of the Australian sample of responding parents indicated that they considered themselves to be *musical* in some way (66.0%). The descriptive data provided by the parents assists in understanding parental interpretation of the term *musical*. The data were grouped into four, observable categories. Two of the categories related to practical involvements with performing, composing and/or listening. One category related to descriptions of own musical behaviours such as the demonstration of a strong musical memory. The fourth category related to personalogical characteristics such as demonstrated emotive connection with music and an awareness of the role emotional responses to music play in the expressive interpretation of that music through performance.

The following examples from the descriptive data provided by parents demonstrate a high level of understanding of the components of the skill and knowledge base of the discipline of music itself. Engagement across a range of musical endeavours is reported. Evidence of parental involvement with instrumental and vocal performance activities is strongly represented. Evidence of regular engagement as a listener is also provided. Larsen (1987) found that parents' listening habits had an influence upon musical opportunities provided for their children.

The data also reveal high levels of musicality amongst parents despite their modest admissions. Of particular interest are responses which describe musical behaviours such as *On piano I can play anything by ear...*(P. 012). Facility with instrumental performance is often attributed to being able to play "by ear" rather than having undertaken formal tuition. Incidences of multiple engagements with instrumental performance are also cited. The data presented here contains an example from a parent who did not consider herself to be *musical* (P. 082), and yet described musical behaviours relating to high level auditory perception (Trehub, Schellenberg and Hill, 1997).

Through such comments responding parents indicated their understanding of musical behaviours across the aesthetic (Sloboda & Davidson, 1996) and cognitive domains (Umemoto, 1997). Young Australian musicians, growing up in homes where parents have both an interest (Papousek, 1996) and an expertise (Hargreaves, 1996) in the musical domain, must certainly be advantaged in their approach to the study of music.

Table 1: Sample of descriptive data provided by parents, in response to ways in which they *considered themselves to be musical.*

Question: *Do you consider yourself to be musical? In what ways?*		
YES/NO	Descriptive response	Parent No.
YES	*I think I only have a small talent for music. I can pick up any instrument and very quickly come to a competent level, but then I get bored with it and give it up.*	004
YES	*I enjoy all types of music, love singing, taught myself beginning banjo, quite advanced treble recorder.*	007
YES	*Very appreciative of music - subscribe to both opera and ballet. Play the guitar for amusement but not well, can sing on key. Love listening to all kinds of music and do so everyday.*	008
YES	*On piano I can play anything by ear (modest too...) and can remember patterns and rhythms very well. I have a good understanding of form of music.*	012
YES	*Sensitivity (very good ear and voice). Interpretative and expressive skills (when in practice) on piano.*	021
YES	*I am a member of several chamber choirs. I have no formal singing training but am a mean sightreader!*	028
YES	*Adore my piano music (do not play). Singing. In my teaching I would like to explore rhythm, music & their relationship to mathematical acquisition - brain patterning.*	038
YES	*Not traditionally in terms of reading music & playing an instrument(s) to a high standard. I believe I have a good ear for music, and enjoy "playing" with rhythm and harmony - I love to sing (for me with children particularly) I find music an important part of my life - inspiring, relaxing, evoking emotion, expression etc. etc.*	042
YES	*Love music of all kinds(mostly!) Have a good "ear". Pick up music quickly (melody etc.). Can play "by ear" despite no training.*	050
YES	*By being able to sing tunes easily. Enjoy music and dance, have learnt guitar, recorder and some keyboard skills as an adult. Have taught self many skills after some lessons. Music seems natural to me.*	060
NO	** No, not really but I am particularly sensitive to having radio stations tuned in properly; records running at exactly correct speed, base [bass], treble etc being balanced [on stereo system]. I was once told I had perfect pitch.*	082

Parents having undertaken, or currently undertaking, some form of formal music tuition

Nearly two thirds of parents of the Australian data sample (66.0%) indicated that they had previously, or were currently, undertaking some form of formal music tuition. Descriptive data provided by parents were organised into five categories. The first, and most frequently cited category, included *longer term instrumental or vocal tuition*. Additionally, responding parents indicated that they were often engaged with more than one area of musical involvement over a number of years. Exposure to formal piano tuition and simultaneous tuition in music theory were frequently cited in these data. This pattern of engagement is commensurate with the structure of the Australian Music Examination Board syllabus which, at the higher examination grade levels, dictates that theoretical studies in music are a prerequisite for performance-based studies.

These data tend to suggest that responding parents involved with formal instrumental and vocal music tuition were engaged with study for higher examination grade levels and therefore, were likely to have undertaken formal music tuition over a period of more than ten years. The findings of this study are similar to that cited by Manturzewska (1990) who found a

predominance of family musical engagement, at a very high level, in the home environments of professional Polish musicians.

A second category of descriptive responses provided by Australian parents included involvement with formal *choral activities*, such as semi-professional participation, as well as church-based or school-based choral engagements. Membership of Sydney's premier concert choirs, for example, is based upon participation of a semi-professional nature. The Sydney Philharmonia Society undertakes an annual public concert series of large-scale works from the standard choral repertory. Accompaniment for some of the society's concerts is provided by the internationally acclaimed Sydney Symphony Orchestra with performances taking place in the Concert Hall of the Sydney Opera House. Parents involving themselves with choral activities over a number of years, in such an organisation, would be "trained" at a very high level in vocal techniques, music reading and music ensemble performance skills. Young musicians living in homes where parents were engaged with such activities would be being regularly exposed to choral repertoire through the involvements of their parents (Larsen, 1987).

School-based elective music studies at both the junior and senior secondary school level were cited in a third category of parental responses. Children attending schools in New South Wales may elect to undertake school-based courses of music as a component of the School Certificate (end Year 10) or the Higher School Certificate (end Year 12) awards (McGaw, 1997). In addition to studying the state devised music syllabus as part of a school-based elective music class, such students are frequently engaged with a range of co-curricular and extra-curricular music activities organised by the school. Responding parents, citing undertakings which included school-based elective music tuition, would have a broad-based knowledge of the practical, theoretical and historical aspects of the discipline of music. The home environments of young Australian musicians, whose parents had previously undertaken such studies, are likely to differ from those where parents' skills and knowledge base in music had not benefited from formal studies of this nature. Sosniak's (1985) investigation of the home environments of American concert pianists found that substantial numbers of parents had not undertaken any form of formal musical tuition. A similar investigation undertaken by Howe and Sloboda (1991) supported Sosniak's (1985) findings. The findings of this Australian study suggest otherwise.

The fourth category of formalised musical engagements cited in the data included *compulsory music courses as part of pre-service teacher training*. These courses included music foundation studies and instrumental studies designed to introduce teacher trainees to musical materials. Additionally, teacher trainees undertake music pedagogy courses which provide the musical skill and knowledge base to implement mandatory music syllabuses in primary (elementary) schools in Australia (Jeanneret, 1995). Responding parents employed as teachers(38.7%) are over-represented in this Australian data sample. The incidence of exposure to formalised music tuition as part of pre-service teacher training courses should therefore have been anticipated. Young Australian musicians living in a home environment where one parent had undertaken formalised studies in classroom music pedagogy could potentially receive a specialised level of assistance not likely to be available to children whose parents had not undertaken such studies (Hargreaves, 1996). Responding parents employed as school-based or studio-based music teachers (8.8%) would have undertaken specialist music studies at a tertiary institution, most notably in university conservatoria, in Australia. Such involvements constitute the fifth category of formal musical tuition described by responding parents.

Table 2 contains examples from the descriptive data which illustrate the breadth and diversity of parents' engagements with *formal music tuition*. Of particular interest are the high levels of attainment resulting from formalised music study extending over many years and the incidence of multiple musical involvements and attainments.

Manturzewska (1990) found that in the case of professional Polish musicians, 93% came from families in which parents were musically involved. She concludes that although musically involved parents are *not an essential prerequisite of a professional career in music...it is undoubtedly a factor of considerable importance* (1990, p 119).

Table 2: Sample of descriptive data provided by parents, in response to *types of formal music tuition undertaken.*

Question: *Have you ever undergone any formal tuition in music? Describe type, when you participated and over what period of time.*		
YES/NO	Descriptive response	Parent No.
YES	*School music lessons as a child as part of curriculum- 1 yr piano, 1yr violin, 1 yr ukulele which led later to a few guitar lessons as a young adult. Also sang in choir at school & church as a young women.*	008
YES	*Piano lessons - from age 5-12.* *Music - as an elective - at school, to HSC.* *Guitar lessons - from age 19-20.* *Singing lessons - from age 16-22.*	015
YES	*During primary/secondary school - basic music education from which I learned little re music theory but loved participation incl. choral work.* *Guitar lessons - during education as a General Studies subject included some sight reading, chords, developing own pieces, group work.* *Kodaly developmental music program, - studied as part of Dip. T. (E.C) over twelve month period.*	042
YES	*Nuns on violin (to 8th grade) and piano (to 7th grade), 6yrs to 18yrs. 3 years violin tuition during B. Mus with Carl Pini. Sat for (and passed) A. Mus. A and L.T.C.L. as an adult when having no lessons.*	061
YES	*Began practical piano lessons at 5 yrs & continued to 17yrs. Won numerous scholarships & eisteddfods. Travelled weekly to Sydney Conservatorium for lessons during my teenage years.*	065
YES	*I learned piano for 7 years and violin for 3 yrs. I have in recent years completed 4 yrs study of musicianship attaining AMEB grade 6.*	069
YES	*I attended music lectures as part of my teacher education course-1hr/week for 1 year I think. As a teacher I attended inservice music workshops over a period of 3years. I regard my formal tuition as listed above as extremely limited.*	072
YES	*Learnt the piano from age 6 yrs. Learnt the violin during high school. Elective music through to year 12. Studied music at university.*	081
YES	*Did 4 years as a 10-14 yr. old. Was taught organ with a view to playing a piano accordion! Yuk! Not exactly a popular instrument in the late 60's. I simply refused to continue. I do recall my grades (AMEB) were all 90%+ - but my parents gave me no choice of instrument.*	082
YES	*I desperately wanted to play the piano but did not commence formal tuition until I was 10 yrs old. It was traditional piano, & no ear training was given. The only pieces learnt were for the AMEB exams. When I was 17 and at 6th grade level, I stopped lessons. I also did theory exams up to 5th Grade.*	135
YES	*I studied piano as a child reaching Eighth grade standard and completed fifth grade musicianship.*	137
YES	*I began singing as 2.5 [yrs] behind my big brother, went on to learn piano. I studied at Sydney Con. & did 4yr special music teachers course (Dip. Mus. Ed).*	143

Parents' current involvements with musical activities.

The third dimension of musical involvement explored as part of this study, was a consideration of parents' current musical involvements. Nearly two thirds of the sample (64.4%) indicated that they were currently involved with musical activities. Five categories of activities were revealed in the descriptive data, the fifth being divisible into two sub-categories: practical involvements; community-based practical involvements; ardent listening; work related involvements; and assisting and supporting own children's involvements. These categories are closely aligned with those reported in a study conducted by Sloboda and Howe (1991).

Responding parents reported *practical involvements* such as playing and singing for enjoyment. Sometimes these engagements were home-based or with experienced amateur peers.

Sloboda and Howe (1991) found that parents of students attending a specialist music school in England reported *occasional amateur performance* in 36% of cases.

A second category of musical activities relates to *regular music performance participation in community-based music ensembles* (e.g. choir or band). Sloboda and Howe's (1991) study contained a similar finding with 14% of parents of the English data sample indicating regular involvement with *amateur performance*. The descriptive data from the Australian sample reveal an additional dimension. Frequently, Australian parents were responsible for leading or directing the community-based music ensemble in which they participated. Musical engagement of this type would tend to demonstrate a high level of commitment to personal music making.

The third category of musical activities revealed by an analysis of the descriptive data of the Australian sample concerns parental musical involvement as *ardent listeners* (Larsen, 1987). This takes the form of regular attendance at live performances by professional musicians. Sloboda and Howe (1991) also found that parents of students attending a specialist music school reported *regular listening to serious music*. An associated study by Howe and Sloboda (1991) confirmed that parental listening habits had a significant, positive impact upon the child's musical environment suggesting that *music as an element of home life was simply taken for granted* (1991, p. 43).

The fourth category of musical activities revealed by the Australian data sample also aligns with the findings of Sloboda and Howe(1991). Parental involvement with *professional music teaching or performing* is cited by participants in both studies. Engagement of this type is to be expected from the Australian data sample where 8.8% of responding parents have indicated being employed either as classroom or studio music teachers.

Descriptive data revealed an unexpected pattern of responses in the case of the fifth category of musical activities. Responding parents listed involvement with their children's musical activities amongst their own musical involvements. Two sub-categories were identified: *direct musical assistance to the child*, and *involvement with parental support groups* of music organisations of which the child was a member. Examples of the forms of musical assistance provided for the child were *help with daily music practise sessions* and *acting as an accompanist for the child's musical examinations and music competitions*. These findings should be considered in the context of the number of Australian families indicating involvement with the Suzuki music methodology.

The role of the parent in the Suzuki Talent Development Program is unique in music education methodologies. In describing the role of the mother of a Suzuki child, Mills (1973) includes attendance at lessons and assistance with music practice in lists of parental responsibilities. Both these activities featured in the descriptive data which related to the musical involvements of Australian parents. It would appear that exposure to, and involvement with Suzuki music methodologies had influenced parents' responses to this survey item.

Responding parents also cited voluntary involvements with music organisations of which their child was a member. These findings suggest that parents, many of whom are musically qualified and currently involved with a range of their own musical activities, consider support of their child's music education as an integral part of their own musical life. Coupled with the data from the larger study, which indicated that parents have taken a deliberate break from professional careers for home-making duties, the level of parental commitment to the child's education, and in particular the child's music education, would appear to be high. Papousek (1996) considers the role of intuitive parenting in the musical stimulation of infants. The Australian data tend to suggest a that talented young Australian musicians may have been exposed to parenting behaviours which resulted in an atypical exposure to musical stimulation at a very young age.

Parents of young Australian musicians indicate a high level of previous and current involvement with a range of music making endeavours. These findings differ from those of Howe and Sloboda (1991) who indicate that 36% of students attending a specialist music school in

England come from families where parents were not interested in music or were engaged only in music listening. The data do, however, concur with earlier investigations conducted by Shuter-Dyson (1985) and Shetler (1979) who found that music in the childhood home was an important factor in the career advancement of outstanding young musicians and symphony orchestra musicians.

More recent investigations by Sloboda and Davidson (1996) highlight the importance of increased parental involvement with musical engagements, as a significant distinguishing factor for high musical achievers. It appears that committed parents demonstrate support for their child's musical activities by becoming more involved with musical engagements themselves. The Australian data supports this finding. The data do not, however, allow the extent to which Australian children have been influenced by their parents' musical interests to be empirically established. It would appear that parents' exposure to formal music tuition over many years, and diverse and continuing interests in their own music making, firmly establish the place of music as an integral part of the family's way of life.

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